Operating Manual

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TTC™

OPTIMIZING NETWORK PERFORMANCE

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Rev. B

DS1/DS3 ATM INTERFACE
(MODEL 43440)
OPERATING MANUAL

NOVEMBER 1997

This interface requires FIREBERD 6000 software revision P or higher.

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SECTION 1 GENERAL INFORMATION

1.1 MANUAL SUMMARY

This manual contains information on Telecommunications Techniques Corporation's (TTC) DS1/DS3 ATM Interface (Model 43440). The manual is divided into sections on: general information; interface description, installation and operation (to include mainframe setup), interface specifications, and maintenance and service information. In addition, there are appendices on factory default settings and remote control commands.

1.2 DS1/DS3 ATM INTERFACE MODULE OVERVIEW

The DS1/DS3 ATM Interface Module enables the FIREBERD 6000 Communications Analyzer to test ATM circuits and equipment operating at the DS1 rate of 1.544 MHz as well as the DS3 rate of 44.736 MHz. The module is capable of performing the following tests:

- DS1 and DS3 physical layer analysis including line and framing error detection, alarm indicators, etc.
- TC sub-layer tests include PLCP and HEC based cell mapping; PLCP alarms, statistics and error insertion; and HEC generation, checking, and erroring.
- ATM layer tests include transmitting and receiving cells with a pre-defined or user-defined payload, measuring cell round trip delay and traffic shaping conformance per ATM Forum GCRA requirements, monitoring lost or misinserted cells, generating/receiving OAM cells, and automatic scanning of active VPI/VCIs.
- AAL layer tests include automatically recognizing AAL1, 3/4, or 5 activity on a selected VPI/VCI, and acquiring AAL1, 3/4 or 5 SAR PDU and AAL 3/4 or 5 CS PDU statistics.

Support for IEEE 488.2 control is incorporated into the FIREBERD 6000 and can be used to control and monitor DS1/DS3 ATM Interface Module.

1.3 INTERFACE COMPATIBILITY

The DS1/DS3 ATM Interface Module complies with the following publications and specifications:

- AT&T Publications 41541
- ANSI T1.102-1987
- Bellcore Publications TR-TSY-000499, and TR-TSV-000773
- ATM Forum UNI Specification V.3.1
- CCITT I.432

1.4 CABLES

The following cables are available for use with the DS1/DS3 ATM Interface Module:

- Model 10830 — 440A to BNC Adapter Plug.
- Model 30745 — 10' cable, BNC to BNC (75 Ω).
- Model 30662 — 6' cable, BNC to BNC (75 Ω).
- Model 10559 — 10' cable with WECO plug to bantam plug.
- Model 10599 — 4' cable with WECO plug to bantam plug.
- Model 10615 — 10' cable with bantam plug to bantam plug.
- Model 10648 —7' cable with bantam plug to alligator clips.
- Model 30503 — 10' cable with bantam plug (dual) to 15 pin D male connector.
- Model 40601 — 10' cable with bantam plug (dual) to RJ-48C.
- Model 40602 — 10' cable with bantam plug (dual) to RJ-45S.

SECTION 2 INTERFACE DESCRIPTION

2.1 INTRODUCTION

The DS1/DS3 ATM Interface is menu-controlled through the FIREBERD 6000 Communications Analyzer front panel controls. The interface may also be remotely controlled using the standard RS-232 interface built into the FIREBERD 6000 or the optional IEEE-488.2 interface for the FIREBERD 6000. This section describes the DS1/DS3 ATM Interface physical characteristics, functional characteristics, and self-loop operation.

2.2 PHYSICAL DESCRIPTION

The DS1/DS3 ATM Interface Module measures 7.3 inches (185 mm) wide, 1.5 inches (38 mm), high and 5.3 inches (133 mm) deep. Two spring-tensioned screws secure the interface module to the FIREBERD 6000 rear panel. Connector pins on the interface module mate with the mainframe connector receptacle when the interface panel is flush with the mainframe rear panel. The Interface Module has five connectors on the front panel (Figure 2-1):

- DS3 IN
- DS3 OUT
- DS1 IN
- DS1 OUT
- CLOCK IN

Each connector is described in the following section.

Figure 2-1. The DS1/DS3 ATM Interface Module

2.2.1 DS3 IN/DS3 OUT/CLOCK IN Connectors

DS3 IN is a 75 Ω BNC connector that conducts an incoming DS3 signal, from the circuit under test, to the input circuitry of the FIREBERD 6000. The characteristics of this signal are described in Section 4: Interface Specifications.

DS3 OUT is a 75 Ω BNC connector that enables the FIREBERD 6000 to transmit a DS3 signal to the circuit under test. The characteristics of this signal (DSX or HIGH) are defined in the OUTPUT category of the DS3 CONFIG menu and in Section 4 Interface Specifications.

CLOCK IN is a 75 Ω BNC connector that enables an external clock source to be connected to the interface module. The received clock source may be used for DS1 or DS3 transmit timing, or for DS3 PLCP transmit timing.

2.2.2 DS1 IN/DS1 OUT Connectors

DS1 IN is a Bantam connector that conducts an incoming DS1 signal, from the circuit under test, to the input circuitry of the FIREBERD 6000. The characteristics of this signal (TERM, BRDG, or DSXMON) are defined in the INPUT category of the DS1 CONFIG menu.

DS1 OUT is a Bantam connector that enables the FIREBERD 6000 to transmit a DS1 signal to the circuit under test.

2.3 SELF-LOOP OPERATION

The DS1/DS3 ATM Interface Module includes a relay that is activated by the **SELF LOOP** switch on the front panel of the FIREBERD 6000. Activation of the **SELF LOOP** switch causes an analog loopback of the selected (DS1 or DS3) Tx AMI signal to the Rx AMI input prior to leaving the interface. When the self-loop test is in progress, the red LED in the **SELF LOOP** switch illuminates. The **SELF LOOP** switch also enables the FIREBERD 6000 to be disconnected from the ATM circuit under test without removing cables from the interface.

NOTE

In SELF-LOOP mode, only the receiver is disconnected, the transmitter can be used as per normal operation

2.4 TIMING SOURCES

The transmit timing source is selectable by use of the FIREBERD 6000 front panel **GEN CLK** switch as follows:

- SYNTH enables the use of the interface on-board 44.736 MHz oscillator (DS3 mode) or 1.544 MHz (DS1 mode) for transmit timing.
- INTFC enables transmit timing to be recovered from the received signal (DS1 or DS3).
- BNC enables transmit timing based on the interface module Clock Input BNC connector.

SECTION 3 INSTALLATION AND OPERATION

3.1 INTRODUCTION

This section describes how to install, configure, and operate the DS1/DS3 ATM Interface when used in the FIREBERD 6000. Refer to the FIREBERD 6000 User's Guide and FIREBERD 6000 Reference Manual for mainframe operating procedures.

NOTE

To avoid unnecessary downtime, configure the FIREBERD 6000 and the DS1/DS3 ATM Interface Module prior to connecting to the circuit under test.

3.2 INTERFACE INSTALLATION

The following procedure describes the steps required to install the DS1/DS3 ATM Interface Module in the FIREBERD 6000 mainframe (see Figure 3-1).

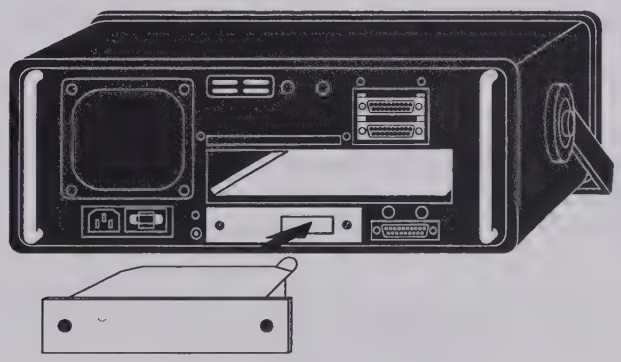


Figure 3-1. DS1/DS3 ATM Interface Installation

1. **Turn the FIREBERD 6000 AC power off.**
   Set the FIREBERD 6000 AC power switch to the OFF position and disconnect the AC power Cord.

2. **Position the Module.**
   Facing the FIREBERD 6000 rear panel, position the Module as shown in Figure 3-1 (faceplate facing out).

3. **Install the Module.**
   Verify that the interface PC board edges fit into the card guides in the FIREBERD 6000 and then slide the Module into the unit until the module faceplate is flush with the rear panel.

4. **Secure the Module.**
   Secure the module to the FIREBERD 6000 by turning the two thumbscrews on the module front panel clockwise, until finger tight only.

5. **Turn FIREBERD 6000 AC power on.**
   Reconnect the AC power Cord and set the FIREBERD 6000 AC power switch to the ON position.

3.3 FIREBERD 6000 MAINFRAME SETUP

The following steps define the set-up procedure for the FIREBERD 6000 mainframe after the interface installation is complete.

1. **Power on the FIREBERD 6000.**
   Apply power to the FIREBERD 6000 mainframe. If the LED in the **SELF LOOP** switch illuminates, press the switch to turn the Self-Loop LED OFF.

2. **Select the Timing Source.**
   Set the generator clock to SYNTH, INTFC, or BNC, as required, by pressing the **GEN CLK** switch until the LED next to the desired selection is illuminated.

NOTE

When the DS1/DS3 ATM Interface is enabled, the DATA LED is turned OFF, and the following front panel switches are not operable: **TIMING MODE, SYNTH FREQ, CHAR FORMAT**, and **JITTER**.

3. **Select Interface Setup.**
   Press the **MENU** switch until the LED next to INTFC SETUP is illuminated. Figure 3-2 illustrates the interface selection menu. The message **INTERFACE: XXXXXX** (where XXXXXX is the current interface selected) is visible on the top line of the display and the available interfaces are displayed on the bottom line.

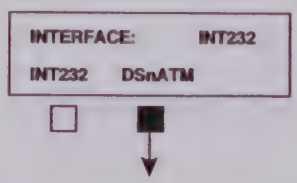


Figure 3-2. Interface Menu Selection Display

4. **Select the DS1/DS3 ATM Interface.**
   Press the softkey below the DSnATM menu item to select the DS1/DS3 ATM Interface. Pressing this softkey displays **DSnATM:xxx, xxxx, xxx** (where **xxx, xxxx, xxx** are the current menu selections) on the top line and the first three menu items on the bottom line. The softkeys are used to select the desired menu item to be verified or changed. The LED within the **MORE** switch is illuminated, indicating that additional menu items are available and are displayed when the **MORE** switch is pressed. Figure 3-3 illustrates the DS1/DS3 ATM interface top-level menu.

Figure 3-3. DS1/DS3 ATM Interface Menu Top Level Display

5. **Change/verify parameters.**
   Once the desired DS1/DS3 ATM interface menu parameters are visible in the display, press the corresponding softkey(s) to verify or change the interface operating parameter(s). Refer to Section 3.4 for explanations of the interface parameters and their selections.

6. **Verify other criteria as required.**
   Press the **MENU** switch to verify other criteria (TEST INTERVAL, PRINT EVENT, and AUXILIARY) as required for the test to be performed (refer to Section 3.8 for the valid Auxiliary functions).

7. **Set Front Panel Control switches.**
   Set the other Front Panel control switches (RESULT SELECT, CATEGORY, PRINTER, etc.) as required to configure the mainframe for the test to be performed.

8. **Perform self-loop test.**
   Press the **SELF LOOP** switch to perform the self-test of the mainframe and the DS1/DS3 ATM Interface Module. The LED in the **SELF LOOP** switch illuminates while the test is running.

9. **After the self-loop test is verified, press the SELF LOOP switch to extinguish the LED and halt the self-loop test.**

10. **Connect the Cables.**
    Connect the required cables to either the DS1 IN and DS1 OUT Bantam connectors, or the DS3 IN and DS3 OUT BNC connectors. If required, connect an external clock signal to the CLOCK IN BNC connector.

3.4 INTERFACE SETUP

This section provides a summary of the general setup and use of the interface, followed by detailed descriptions of the menu selections available for the DS1/DS3 ATM Interface Module. The general setup and use of the interface is as follows:

- Set up Physical and TC (Transmission Convergence) sublayers and cell format (see Sections 3.4.1 through 3.4.3).
- Scan for active VPI/VCIs (see Section 3.4.6).
- Set up transmitter (intrusive testing only - see Section 3.4.4):
  — Setup primary channel header descriptors, traffic shape, payload, and rate.
  — Setup header descriptors, payloads, and rates for background channels (if desired).
- Setup Receive stream header filter (intrusive and monitor only testing - see Section 3.4.5).

- Select the desired analysis to be performed on the filtered receive data stream (see Section 3.4.5).
- Insert errors or OAM cells on Tx side to verify connectivity through test setup, if desired (see Section 3.4.4).
- Conduct desired testing.

The DS1/DS3 ATM Interface is selected through the FIREBERD 6000 front panel controls and is then controlled through the FIREBERD 6000 front panel switches and softkeys. Observe the display above the softkeys and verify that **DSnATM** is displayed on the top line and the first three menu selections (TX, RX, and SCAN) are displayed on the bottom line, as illustrated in Figure 3-3. If the DS1/DS3 ATM Interface menu is not displayed, press the **MENU** switch to illuminate the LED next to the INTERFACE label. Then press the softkey below the DSnATM menu item on the bottom line to select the DS1/DS3 ATM Interface.

With the DS1/DS3 ATM Interface selected, the first three DSnATM interface menu items are displayed on the bottom line and the LED in the **MORE** switch is illuminated, indicating that there are additional menu items (Figure 3-3 illustrates the DSnATM interface top level menu). Pressing the **MORE** switch displays the three additional menu selections. Pressing the softkey below a top-level menu item enters that menu and displays the menu status and selections available for that selection.

To view a previous menu level, press the <Up Arrow> key to display the next higher menu level. To view the top-level menu, repeatedly press the <Up Arrow> key until the top-level menu is displayed, or press the **ENTER** switch. By using a combination of the softkeys, the **MORE** switch, the <Up Arrow> key, and the **ENTER** switch, the user is able to view any DS1/DS3 ATM Interface menu.

The following paragraphs describe the DSnATM menu items and the choices available for each menu selection. Refer to Figure 3-4 to view the entire DSnATM interface menu during the following discussions of the menu items.

NOTE

The ACCESS, TC, and FORMAT menus are discussed first, as they are the first menus used to setup the unit, even though they are not the first items in the top level menu display.

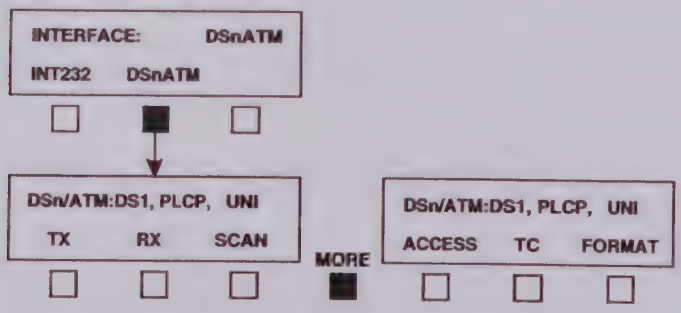


Figure 3-4. DS1/DS3 ATM Interface Menu Overview

3.4.1 ACCESS Menu

ACCESS — Pressing this softkey displays the ACCESS menu. The ACCESS menu, illustrated in Figure 3-5, displays the currently selected physical layer. Two menu selections — DS1 and DS3 are visible on the bottom line of the display. These softkeys enable configuration of the DS1 and DS3 physical layers.

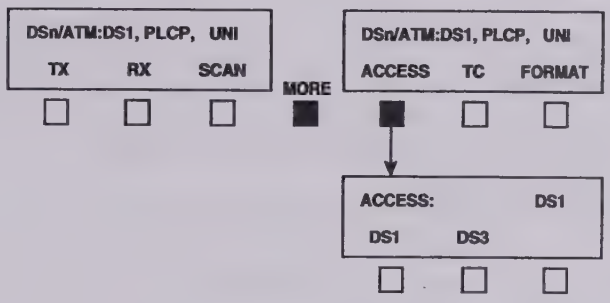


Figure 3-5. Access Menu Display

DS1 Menu

DS1 — Pressing this softkey displays the DS1 physical layer configuration menu. The DS1 menu, illustrated in Figure 3-6 displays the currently selected framing, coding, input termination, transmit line build out and operating mode. Three menu selections — FRAME, CODE, and INPUT are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays two additional menu items — LBO and MODE.

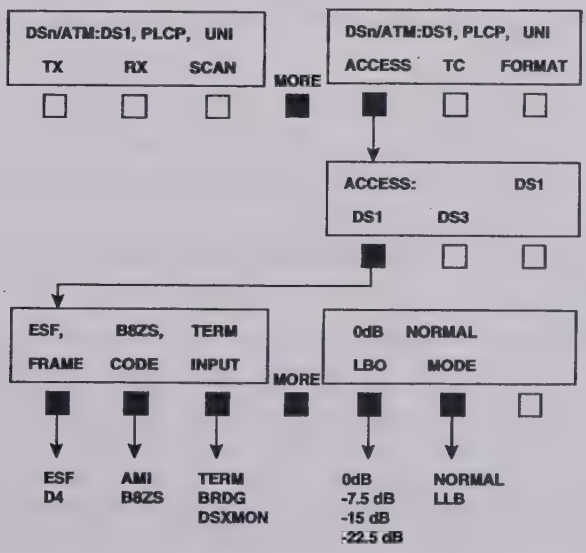


Figure 3-6. DS1 Menu Display

FRAME — Press the FRAME softkey to select the framed data format for transmission and analysis.

ESF — Enables transmission and analysis of T1 signals with Extended SuperFrame (ESF) framing format.

D4 — Enables transmission and analysis of T1 signals with D4 (SuperFrame) framing.

NOTE

With ESF or D4 framing selected, the receiver frequency measurements are available only when the data interface is in continuous frame synchronization with the incoming data. If there is intermittent frame synchronization or no frame synchronization at all (i.e. unframed data), no receiver frequency results will be available.

CODE — Enables selection of either AMI encoded data or B8ZS clear-channel encoding for the transmitted data.

AMI — Selects Alternate Mark Inversion (AMI) coding.

B8ZS — Selects Bipolar with 8 Zero Substitution (B8ZS) coding.

INPUT — Enables selection of input impedance and signal conditioning.

TERM — Selects normal operation, terminating the input with 100 Ω.

BRDG — Selects high impedance monitoring of T1 lines that are already terminated.

DSXMON — Terminates the input in 100 Ω and enables the receiver to operate with signals from DSX-Monitor ports that introduce from -10 dB dsx to -30 dB dsx of resistive attenuation in the receive path.

LBO — Enables emulation of four different cable losses for the T1 output signal level. The selected cable loss affects the transmit data only at the connectors.

0dB — Sets primary output (TX) to DSX level (6.0 V peak to peak ± 5%) with no line buildout (0 dB attenuation).

-7.5dB — Provides -7.5 dB line build-out, attenuating the output with 7.5 dB of simulated cable loss.

-15dB — Provides -15 dB line build-out, attenuating the output with 15 dB of simulated cable loss.

-22.5dB — Provides -22.5 dB line build-out, attenuating the output with 22.5 dB of simulated cable loss.

MODE — Enables the user to select the interface transmit and receive operating mode.

NORMAL — Selects the standard operating mode wherein the FIREBERD 6000 transmits on/originates the line under test. Select NORMAL to perform standard activities associated with in-service monitoring and out-of-service testing of T1 circuits and equipment.

LLB — Selects Line Loopback (LLB) operating mode. This selection causes the interface to act as a repeater. All data received is echoed unchanged on the transmitter output.

DS3 Menu

DS3 — Pressing this softkey displays the DS3 physical layer configuration menu. The DS3 menu, illustrated in Figure 3-7 displays the currently selected framing, output termination, and operating mode. Three menu selections — FRAME, OUTPUT, and MODE are visible on the bottom line of the display.

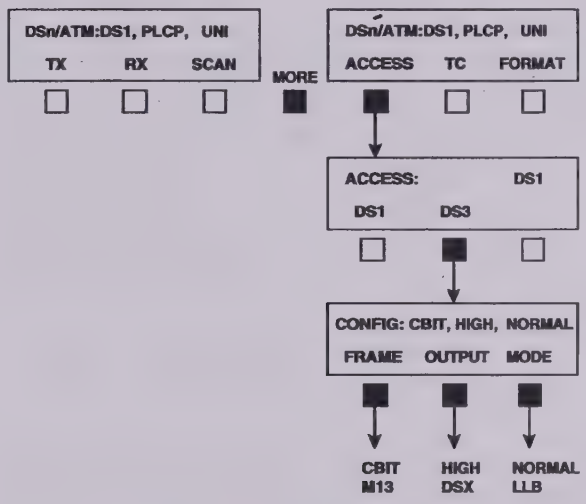


Figure 3-7. DS3 Menu Display

FRAME — Press the FRAME softkey to select the framed data format for transmission and analysis.

NOTE

The transmitter always follows CBIT parity format, selecting M13 framing simply invalidates C-BIT parity unique results.

M13 — Enables Receive testing of DS3 circuits that use M13 framing format.

CBIT —Enables testing of DS3 circuits that use C-Bit framing format.

OUTPUT — Enables selection of output pulse shape and amplitude.

HIGH — Selects high (normal) signal output level (0.95 V ± 5% rectangular).

DSX — Selects DSX output pulse shape, as defined by ANSI T1.102-1987 and Bellcore TR-TSY-000499. The pulse peak is 0.77 V ± 5%.

MODE — Enables the user to select the interface transmit and receive operating mode.

NORMAL — Selects the standard operating mode, wherein the FIREBERD 6000 transmits/originates the link under test. Select NORMAL to perform standard activities associated with in-service monitoring and out-of-service testing of T3 circuits and equipment.

LLB — Selects Line Loopback (LLB) operating mode. Line Loopback is a line side digital loopback that retransmits the received data with no modifications.

3.4.2 TC Menu

TC — Pressing this softkey displays the TC (Transmit Convergence) menu, which enables the user to configure ATM Transmit Convergence Sublayer parameters. The TC menu, illustrated in Figure 3-8 displays the currently selected cell alignment. Two menu selections — CONFIG and ERRINS are visible on the bottom line of the display.

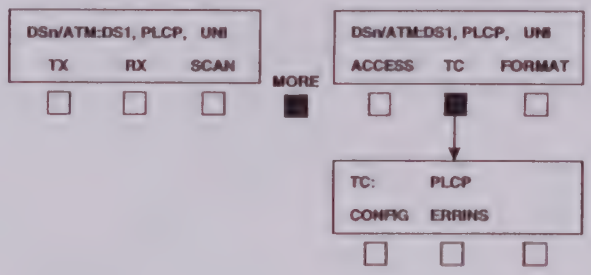


Figure 3-8. TC Menu Display

CONFIG Menu

CONFIG — Pressing this softkey displays the CONFIG menu. The CONFIG menu, illustrated in Figure 3-9 displays the currently selected TC sublayer configuration. Three menu selections —ALIGN, SCRMBL and TIMING are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays two additional menu items — FEBE, and ALARM.

NOTE

Figure 3-9 depicts the CONFIG Menu display with Alignment set to PLCP.

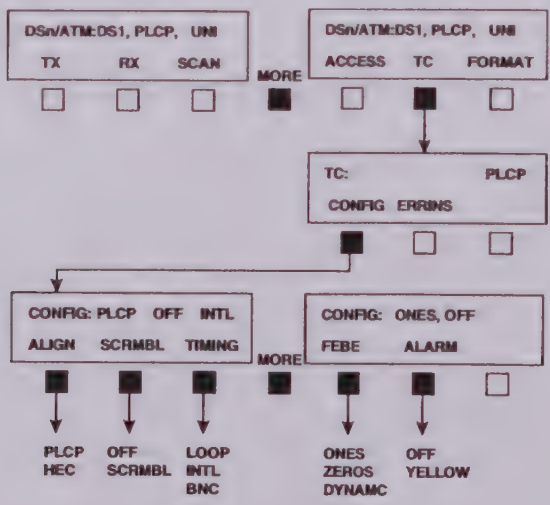


Figure 3-9. CONFIG Menu Display

ALIGN — When pressed, toggles the cell alignment method between PLCP and HEC.

PLCP — Enables Physical Layer Convergence Protocol (PLCP) as the cell alignment method, as per Bellcore TR-TSV-000773.

HEC — Enables Header Error Check (HEC) cell alignment per CCITT I.432.

SCRMBL — When pressed, toggles payload scrambling **ON (SCRMBL)** or **OFF** for either alignment method.

TIMING — This softkey appears when ALIGN is set to PLCP and ACCESS is set to DS3, enabling selection of the PLCP timing source (PLCP TIMING with DS1 ACCESS selected defaults to LOOP).

LOOP — Timing is recovered from the received PLCP frames.

INTL — Timing is synchronized to an internally generated 8 kHz reference (DS3 only).

BNC — Timing is synchronized to the source received via the CLOCK IN BNC connector on the DS1/DS3 ATM Interface module (DS3 only).

FEBE — This softkey appears when ALIGN is set to PLCP, enabling the insertion of FEBE indications.

ONES — Sets the transmitted PLCP FEBE to 1111, indicating to the far-end that PLCP BIP-8 error detection is inactive.

ZEROS — Sets the transmitted PLCP FEBE to 0000, indicating to the far-end that PLCP BIP-8 error detection is enabled.

DYNAMC — Sets the transmitted PLCP FEBE to the number of PLCP BIP-8 errors (0 - 8) detected in the last received PLCP frame.

ALARM — This softkey appears when ALIGN is set to PLCP, and when pressed, toggles alarm insertion between OFF and YELLOW.

OFF — Turns alarm insertion OFF.

YELLOW — Inserts a YELLOW alarm into every PLCP frame.

ERRINS Menu

ERRINS — Pressing this softkey displays the ERRINS menu. The ERRINS menu, illustrated in Figure 3-10 displays the currently selected error insert (ERRINS) type and rate of insertion for the primary stream. Three menu selections — TYPE, SINGLE and RATE are visible on the bottom line of the display.

NOTE

When RATE is selected the SINGLE softkey is replaced by the OFF softkey, enabling continuous error insertion to be turned OFF.

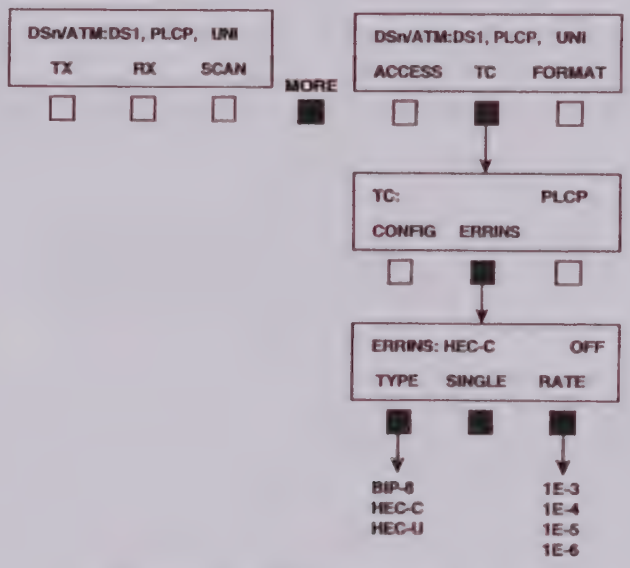


Figure 3-10. ERRINS Menu Display

TYPE — Selects the type of error to insert: either a correctable HEC error (HEC-C), an uncorrectable HEC error (HEC-U) or a PLCP BIP-8 error (available only when TC alignment = PLCP).

SINGLE\OFF — Pressing SINGLE inserts the specified error once each time the softkey is pressed. When the RATE softkey is pressed, the label changes to OFF. Pressing this softkey when the label displayed is OFF turns off error rate insertion and the label returns to SINGLE.

RATE — Pressing this softkey turns off single error insertion and causes the specified error to be inserted at the cell rate specified (1E-3 through 1E-6).

3.4.3 FORMAT Menu

FORMAT — Pressing this softkey displays the FORMAT menu (Figure 3-11) and toggles the cell header format between UNI (User-Network Interface) and NNI (Network-Node Interface).

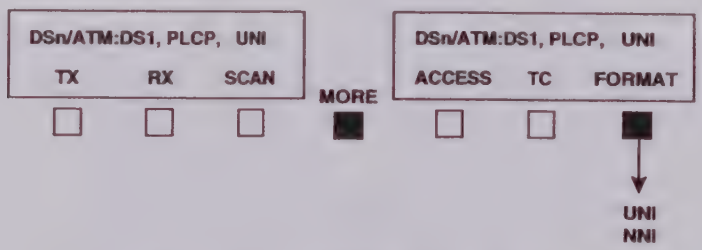


Figure 3-11. FORMAT Menu Display

3.4.4 TX Menu

TX — Pressing this softkey displays the TX (Transmit) menu. The Transmit (TX) menu enables the user to access the transmit capabilities of the DS1/DS3 ATM Interface. The interface can transmit cell streams over the Primary Stream, Background 1 Stream and Background 2 Stream simultaneously. Each stream has a specific transmission rate and payload. The Primary (PRI) stream, which can transmit fixed rate or burst rate traffic, is composed of either proprietary test cells (see Table 3-1 for test cell format) or OAM cells. In Fixed rate mode, the interface acts to achieve optimum, even spacing between cells consistent with the selected line utilization or cell rate. In Burst mode, the Transmit cell stream is configured with a selectable rate and duration by defining the SCR, PCR and MBS.

Table 3-1. Test Cell Format of Primary Cell Stream

Field	Size	Description
ATM Header	5 octets	User defined ATM header.
TTC Identifier	3 octets	Delineates TTC test cells from other traffic on the VPI/VCI stream. Value is set to, and checked for, 0x747463.
Test Cell Type	1 octet	This field is set to 4, but not checked.
Sequence Number	2 octets	16-bit value which increments by one. The sequence analysis specified above will be run on this field. The first sequence number transmitted is not guaranteed to be any specific value.
Correlation Tag	2 octets	This field is set to all zeros and is not checked.
Timestamp A	4 octets	A 24-bit timestamp is injected into the first three bytes, the last byte is set to 0x00. CRTD analysis is performed on the first three bytes of this field.
Timestamp B	4 octets	Not used. Set to all zeros.
Data	30 octets	The data field may be filled with any user selected data. This field is not checked.
Fill	6 bits	Fill bits to even out the CRC-10. Set to zero, not checked.
CRC-10	10 bits	CRC-10 injected and checked by the ATM transceiver.

Table 3-2. TTC Test Cell Type 1 Format

Field	Size	Description
ATM Header	5 octets	User defined ATM header.
TTC Identifier	3 octets	Delineates TTC test cells from other traffic on the VPI/VCI stream. Value is set to, and checked for, 0x747463.
Test Cell Type	1 octet	This field is set to 1, but not checked.
Sequence Number	2 octets	16-bit value which increments by one. The sequence analysis will be run on this field. The first sequence number transmitted is not guaranteed to be any specific value.
Correlation Tag	2 octets	This field is set to all zeros and is not checked.
Fill	40 octets	Each octet in this field is set to 0x6A and is not checked.

Background streams 1 and 2 (which transmit fixed rate traffic only) are composed of cells with the following format: a five octet header, followed by a 48 octet payload (the payload consists data defined by the selected user pattern).

The TX menu, illustrated in Figure 3-12 displays the current state of the interface transmitter. Three menu selections — INACTV\ACTIVE, HEADER, and RATE are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays two additional menu items — PAYLD and OAM.

NOTE

If the user selects a combination of cell rates/line utilization for the Transmit streams that exceeds 100%, the last requested rate/utilization change will not take place, and will be replaced by the previous selection.

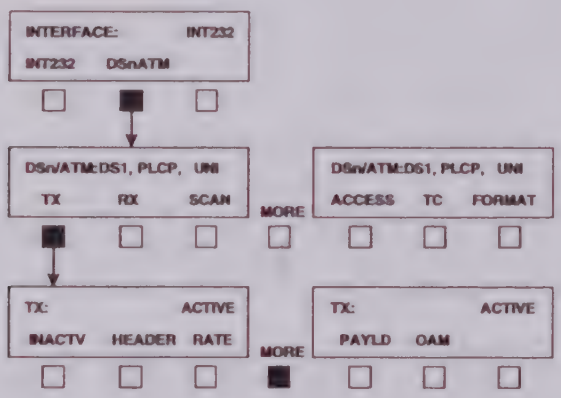


Figure 3-12. TX Menu Display

INACTV\ACTIVE Menu

INACTV\ACTIVE — Pressing this softkey displays the INACTV\ACTIVE menu (Figure 3-13) and toggles the transmitter between the INACTIVE or ACTIVE state.

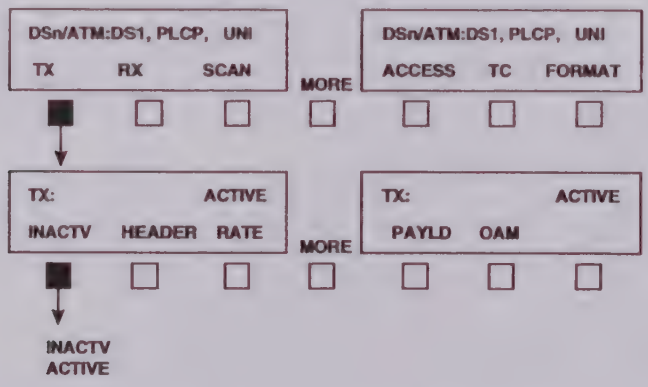


Figure 3-13. INACTV\ACTIVE Menu Display

INACTV— When the display reads INACTV the interface generates only unassigned cells per ATM Forum UNI specification version 3.1.

ACTIVE — When the display reads ACTIVE the interface generates the type of cell traffic specified by the remaining TX submenu options.

HEADER Menu

HEADER — Pressing this softkey displays the HEADER menu. The HEADER menu, illustrated in Figure 3-14 displays the currently selected channel (Primary, Background 1 or Background 2), and the VPI/VCI. Three channel selections are available, one for the Primary test cell stream and two for the background test cell streams Two menu selections — CHAN and VP/VC are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays three additional menu items — PT, CLP, and GFC.

NOTE

This is a data entry page. Binary values for the PTI, CLP and GFC may be entered via the FIREBERD 6000 keypad.

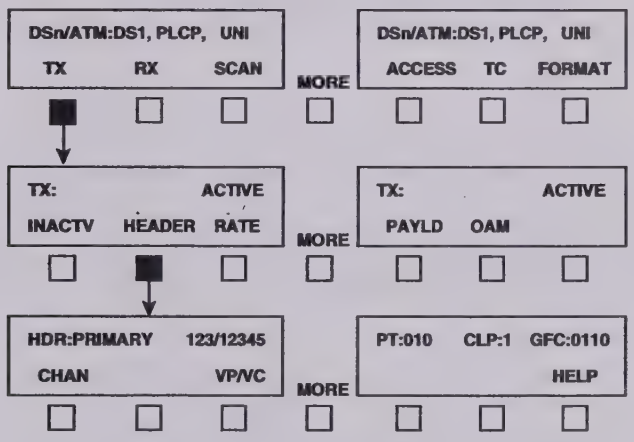


Figure 3-14. HEADER Menu Display

CHAN —Pressing this softkey selects either Primary, BKGD1, or BKGD2, as the transmit channel for which all of the header fields and primary channel selections are specified.

VP/VC Menu

VP/VC — Pressing this softkey displays the VPI/VCI submenu. The VPI/VCI menu, illustrated in Figure 3-15 displays the currently selected, VPI/VCI. The user can enter a VPI/VCI or press the **NEXT** softkey to select the next VPI/VCI combination in the ACTIVE CHANNEL Scan list. See Section 3.4.6 for descriptions of the active channel scan and the ACTIVE CHANNEL Scan list.

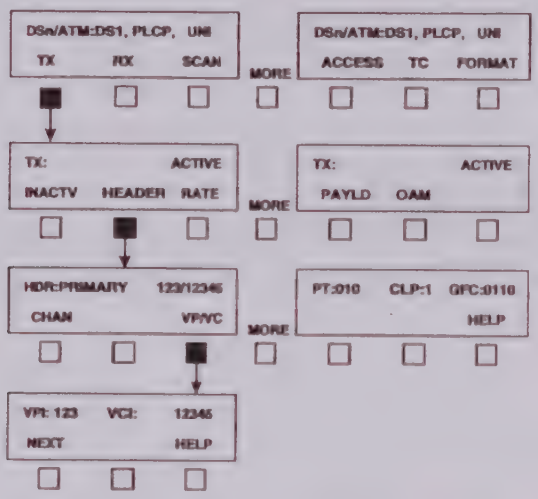


Figure 3-15. VPI/VCI Submenu Display

RATE Menu

RATE — Pressing this softkey displays the RATE menu. The RATE menu, illustrated in Figure 3-16, is used to define the transmit rate and shape of the primary channel and the transmit rates of the two background channels. The menu displays the currently selected traffic generation rate for the primary stream. Three menu selections — PR CBR, PR VBR and BKGD1 are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays one additional menu item —BKGD2.

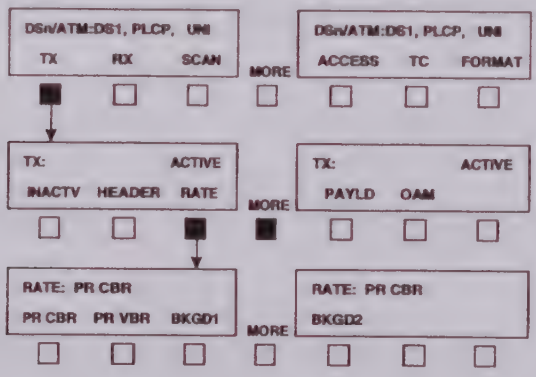


Figure 3-16. RATE Menu Display

PR CBR Submenu

PR CBR — Pressing this softkey displays the PR CBR submenu. The PR CBR submenu, illustrated in Figure 3-17, enables the user to configure the primary transmit cell stream to a fixed cell rate (in cells per second) or to a line utilization (in percent). In fixed transmit mode, the interface will act to achieve

optimum, even spacing between cells consistent with the selected line utilization or cell rate. The menu displays the current primary stream bandwidth utilization for fixed rate cell transmission. Three menu selections — RATE, %UTIL, and HELP are visible on the bottom line of the display. This menu is a data entry page. The fixed rate cell transmission for the primary stream can be entered via the FIREBERD 6000 keypad.

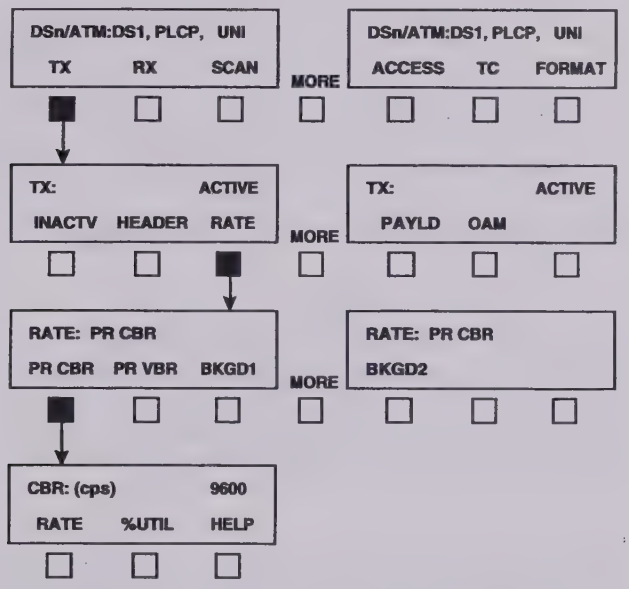


Figure 3-17. PR CBR Submenu Display

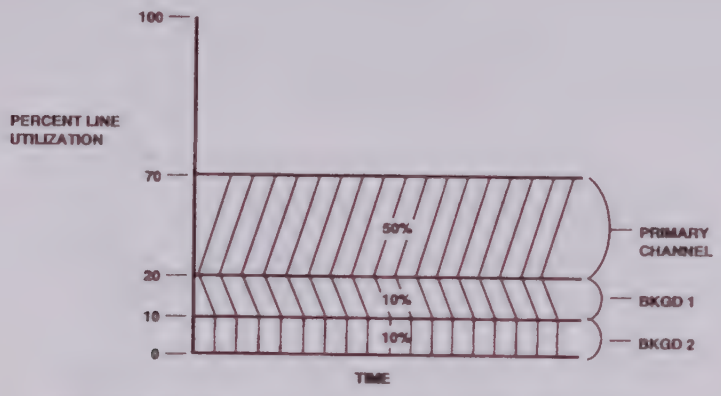
RATE — Pressing this softkey switches the data entry mode to rate transmission in cells per second.

%UTIL — Pressing this softkey switches the data entry mode to percent line utilization.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

In addition to the RATE and %UTIL softkeys, this menu enables the user to enter line utilization or cell rate via the FIREBERD 6000 keypad.

An example of a fixed rate primary cell stream set for 50% line utilization is shown in the following diagram.



FIXED RATE PRIMARY TRANSMIT CELL STREAM SET TO 50% LINE UTILIZATION

NOTE

The interface may not be able to generate the selected rate exactly due to rounding errors (up to ≈ 0.4%). In the event the rate cannot be generated, the actual rate is displayed in place of the value selected. In addition, if the selected rate would cause the sum of all channels (PRI, BKGD1, and BKGD2) to exceed 100% line utilization, then the previous value replaces the selected value in the display.

PR VBR Submenu

PR VBR — Pressing this softkey displays the PR VBR submenu. The PR VBR submenu , illustrated in Figure 3-18, enables the user to configure the primary transmit cell stream with an average cell rate and a selectable burst rate and duration. Three menu selections — SCR, PCR and MBS are visible on the bottom line of the display. The sustained cell rate (SCR) is the average sustained cell rate of the Primary stream. The peak cell rate (PCR) is the average cell rate of the primary transmit cell stream during the burst period. The maximum burst size (MBS) is the number of cells that the primary cell stream will transmit at the PCR.

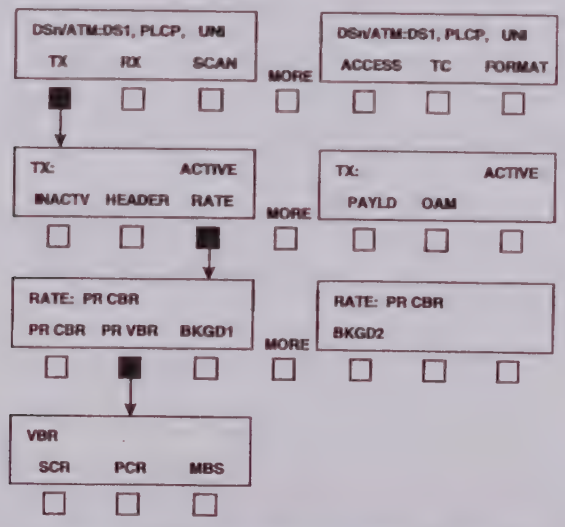
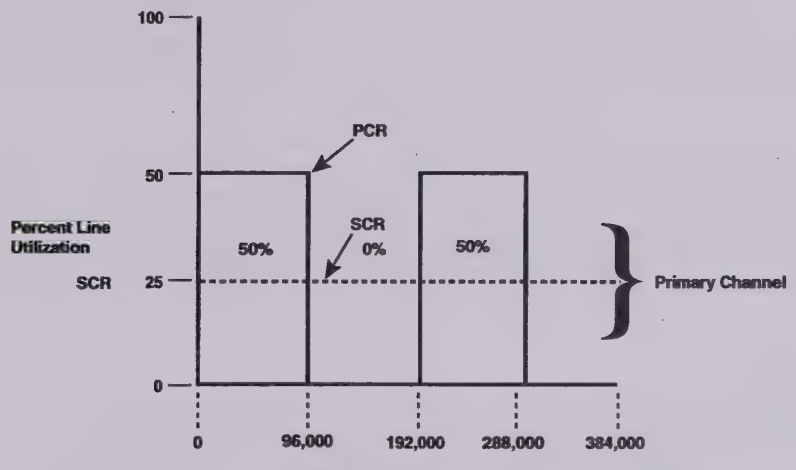


Figure 3-18. PR VBR Submenu Display

An example of the Primary Cell Stream (using DS3 ACCESS with PLCP cell alignment) with the SCR set to 25 %, PCR set to 50 %, and the MBS set to 48,000 cells is shown in the following diagram. Please note that the burst on time is calculated by multiplying the MBS by the reciprocal of the line utilization in this case 48,000 cells by 1/0.5 which equals 96,000 cell times.



PRIMARY CELL STREAM (using DS3 access and PLCP cell alignment)
WITH SCR = 25%, PCR = 50%, AND BURST =48,000 CELLS

SCR Submenu

SCR — Pressing this softkey displays the SCR submenu. The SCR submenu, illustrated in Figure 3-19 displays the currently selected sustained cell rate (SCR). The SCR is the average sustained cell rate of the Primary stream. Three menu selections — RATE, %UTIL and HELP are visible on the bottom line of the display.

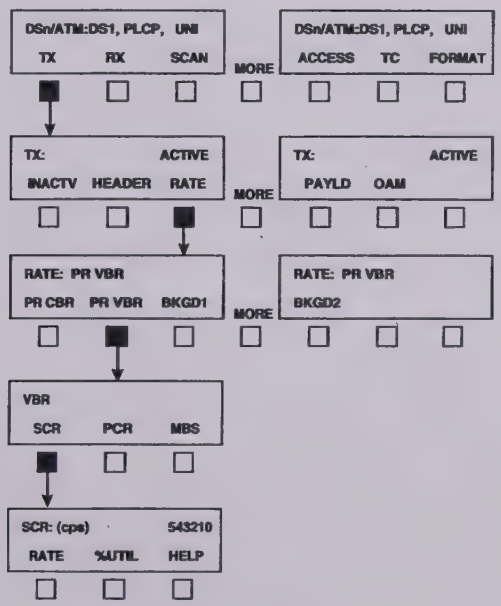


Figure 3-19. SCR Submenu Display

RATE — Pressing this softkey switches the data entry mode to rate transmission in cells per second.

%UTIL — Pressing this softkey switches the data entry mode to percent line utilization.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

In addition to the RATE and %UTIL softkeys, this menu enables the user to enter line utilization or cell rate via the FIREBERD 6000 keypad.

NOTE

The interface may not be able to generate the selected rate exactly due to rounding errors (up to ≈ 0.4%). In the event the rate cannot be generated, the actual rate is displayed in place of the value selected. In addition, if the SCR entered is greater than the PCR, the FIREBERD 6000 will 'BEEP' and the previous value will replace the selected rate.

PCR Submenu

PCR — Pressing this softkey displays the PCR submenu. The PCR submenu , illustrated in Figure 3-20 displays the currently selected peak cell rate (PCR). The PCR is the average cell rate of the Primary Transmit cell stream during the Burst period (the Burst duration is defined in the MBS submenu). Three menu selections — RATE, %UTIL, and HELP are visible on the bottom line of the display.

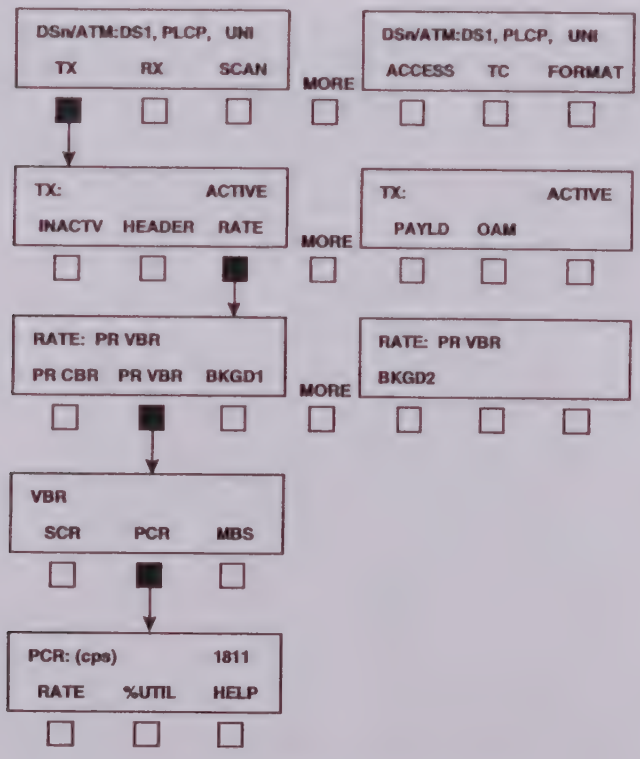


Figure 3-20. PCR Submenu Display

RATE — Pressing this softkey switches the data entry mode to rate transmission in cells per second.

%UTIL — Pressing this softkey switches the data entry mode to percent line utilization.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

In addition to the RATE and %UTIL softkeys, this menu enables the user to enter line utilization or cell rate via the FIREBERD 6000 keypad.

NOTE

The interface may not be able to generate the selected rate exactly due to rounding errors (up to ≈ 0.4%). In the event the rate cannot be generated, the actual rate is displayed in place of the value selected. In addition, if the PCR entered is less than the currently selected SCR, the FIREBERD 6000 will 'BEEP' and the previous value will replace the selected rate.

MBS Submenu

MBS — Pressing this softkey displays the MBS submenu. The MBS submenu , illustrated in Figure 3-21 displays the currently selected burst size in cells. The burst size is the number of cells (from 1 to 65536) that the Primary cell stream will transmit at the Peak Cell Rate (PCR). The burst period is therefore the product of the MBS and the reciprocal of the line utilization — in cell times. The value for the burst size is entered via the numeric keypad. One menu selection — HELP is visible on the bottom line of the display.

HELP — Pressing this softkey provides information on how to enter the maximum burst size.

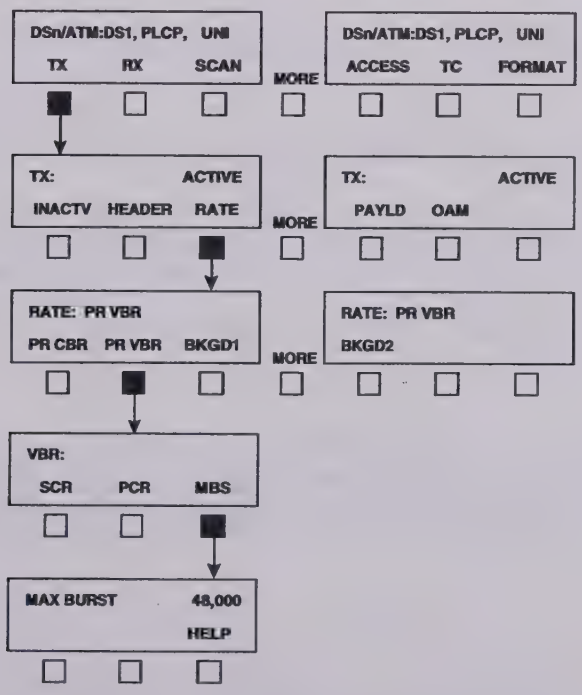


Figure 3-21. MBS Submenu Display

BKGD1 Submenu

BKGD1 — Pressing this softkey displays the BKGD1 submenu. The BKGD1 submenu, illustrated in Figure 3-22 displays the current cell rate transmission configuration for Background Stream 1. Three menu selections — RATE, %UTIL, and HELP are visible on the bottom line of the display.

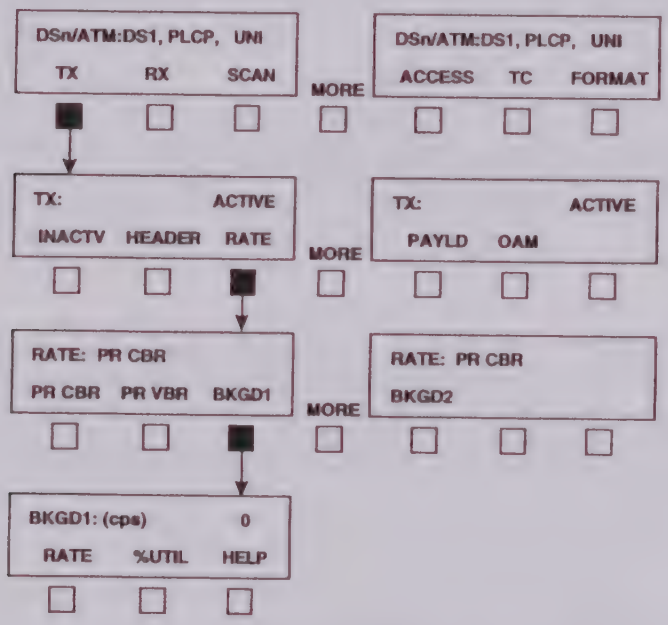


Figure 3-22. BKGD1 Submenu Display

RATE — Pressing this softkey switches the data entry mode to rate transmission in cells per second.

%UTIL — Pressing this softkey switches the data entry mode to percent line utilization.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

In addition to the RATE and %UTIL softkeys, this menu enables the user to enter line utilization or cell rate via the numeric keypad.

NOTE

The interface may not be able to generate the selected rate exactly due to rounding errors (up to ≈ 0.4%). In the event the rate cannot be generated, the actual rate is displayed in place of the value selected.

BKGD2 Submenu

BKGD2 — Pressing this softkey displays the BKGD2 submenu. The BKGD2 submenu, illustrated in Figure 3-23 displays the current cell rate transmission configuration for Background Stream 2. Three menu selections — RATE, %UTIL, and HELP are visible on the bottom line of the display.

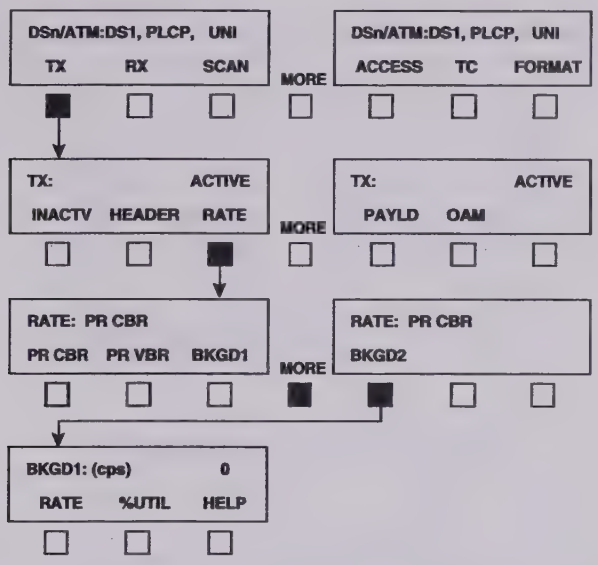


Figure 3-23. BKGD2 Submenu Display

RATE — Pressing this softkey switches the data entry mode to rate transmission in cells per second.

%UTIL — Pressing this softkey switches the data entry mode to percent line utilization.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

In addition to the RATE and %UTIL softkeys, this menu enables the user to enter line utilization or cell rate via the numeric keypad.

NOTE

The interface may not be able to generate the selected rate exactly due to rounding errors (up to ≈ 0.4%). In the event the rate cannot be generated, the actual rate is displayed in place of the value selected.

PAYLD Menu

PAYLD — Pressing this softkey displays the PAYLD (payload) menu. The PAYLD menu, illustrated in Figure 3-24, enables the user to define the contents of the payload padding in the one primary and two background transmit cell streams and displays the currently selected payload. Three menu selections — PRI, BKGD1 and BKGD2 are visible on the bottom line of the display.

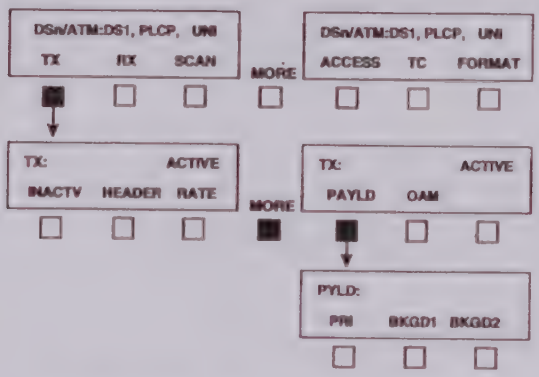


Figure 3-24. PAYLD Menu Display

PRI Submenu

PRI — Pressing this softkey displays the primary payload submenu. The primary payload submenu, illustrated in Figure 3-25, enables the user to specify a one-byte payload, via the keypad, which will fill all unused bytes of the cell payload (see Table 3-1).

NOTE

Only 30 bytes of a given primary stream cell payload are configurable since the first 18 bytes are occupied by TTC Test Cell fields (see Table 3-1).

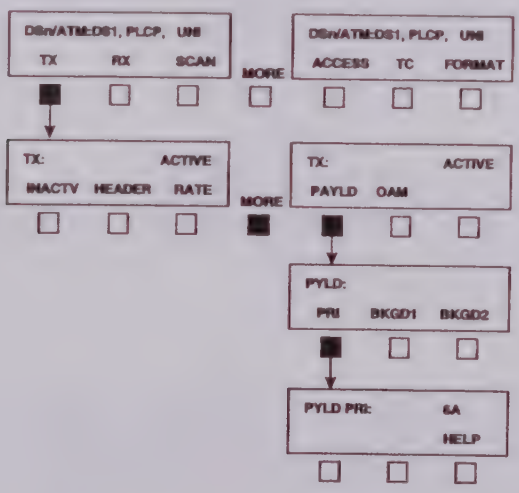


Figure 3-25. PRI Submenu Display

BKGD1 Submenu

BKGD1 — Pressing this softkey displays the BKGD1 submenu. The BKGD1 menu, illustrated in Figure 3-26, enables the user to specify a one-byte payload which will fill all 48 bytes of the cell payload.

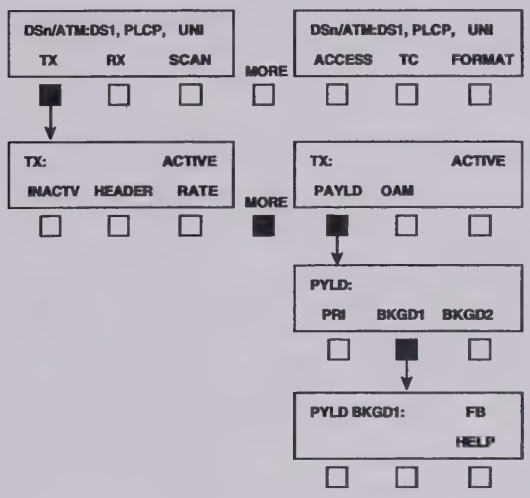


Figure 3-26. BKGD1 Submenu Display

BKGD2 Submenu

BKGD2 — Pressing this softkey displays the BKGD2 submenu. The BKGD2 menu, illustrated in Figure 3-27 enables the user to specify a one-byte payload which will fill all 48 bytes of the cell payload.

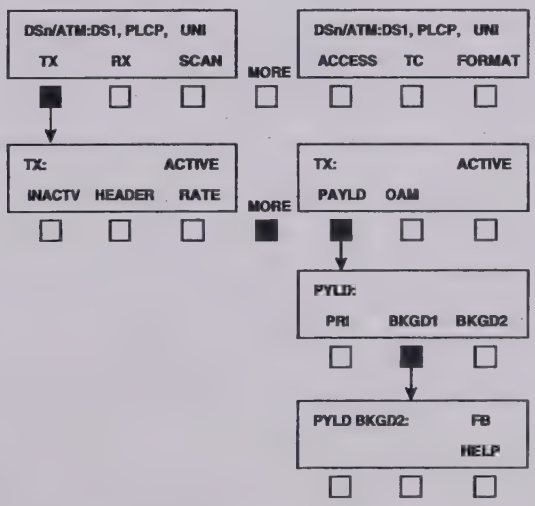


Figure 3-27. BKGD2 Submenu Display

OAM Menu

OAM — Pressing this softkey displays the transmit OAM menu. The OAM menu, illustrated in Figure 3-28 displays the currently selected type of fault management Operations and Maintenance (OAM) message, the OAM management type and the OAM flow type to be transmitted in the primary stream. Three menu selections — SINGLE, TYPE and MGMT are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays one additional menu item — FLOW.

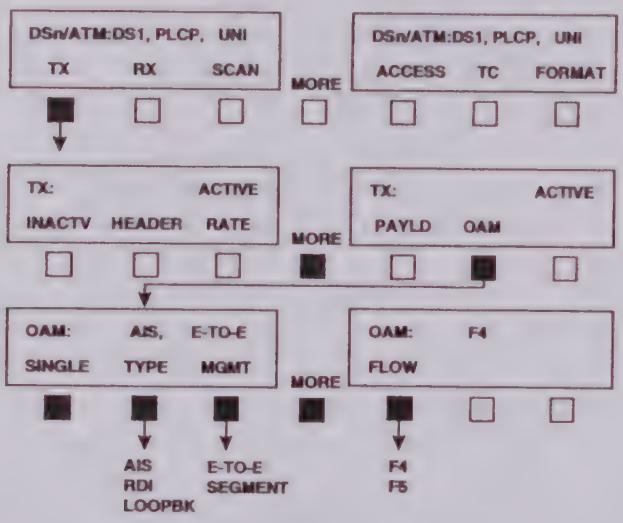


Figure 3-28. OAM Menu Display

SINGLE — Pressing this softkey transmits one OAM cell of the type specified.

TYPE — Pressing this softkey selects the type of OAM message generated.

AIS — Selects the alarm indication signal (AIS) as the OAM message type.

RDI — Selects the remote defect indication (RDI) (or FERF) as the OAM message type.

LOOPBK — Selects loopback (LOOP) as the OAM message type.

MGMT — Pressing this softkey selects the OAM management type.

E-TO-E — Selects end-to end (E-TO-E) as the OAM management type.

SEGMENT — Selects segment as the OAM management type.

FLOW — Pressing this softkey selects the type of OAM flow, either F4 or F5.

3.4.5 RX Menu

RX — Pressing this softkey displays the RX menu. The RX menu, illustrated in Figure 3-29, enables the user to setup the receive cell stream header filter, which includes the definitions for the VPI/VCI, PTI, CLP, and GFC fields. In addition, this menu enables the user to define the analysis type for the receive cell stream. **The selected analysis mode will be performed on cells that match the RX header filter ONLY.** Two menu selections — HEADER and MODE are visible on the bottom line of the display.

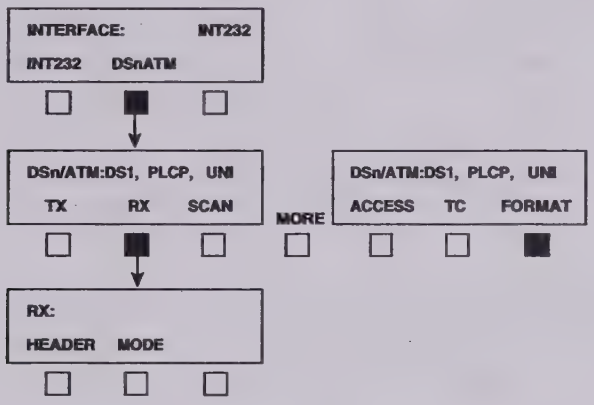


Figure 3-29. RX Menu Display

HEADER Menu

HEADER — Pressing this softkey displays the HEADER menu. The HEADER menu, illustrated in Figure 3-30 enables the user to select a receive header filter and "Don't Care" mask for the receive cell stream to be analyzed. The "don't care" value, displayed as an 'X', is entered via the decimal point button on the numeric keypad. Only cells with headers that match the values (parameters) set for the VPI/VCI, PTI, CLP, and GFC fields will be analyzed. The menu displays the currently selected VPI/VCI. One menu selection — VP/VC, is visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays the header filter specification for the remaining header fields, PTI, CLP, and GFC; also, three additional menu items — CUSTOM, DEFALT, and HELP are displayed.

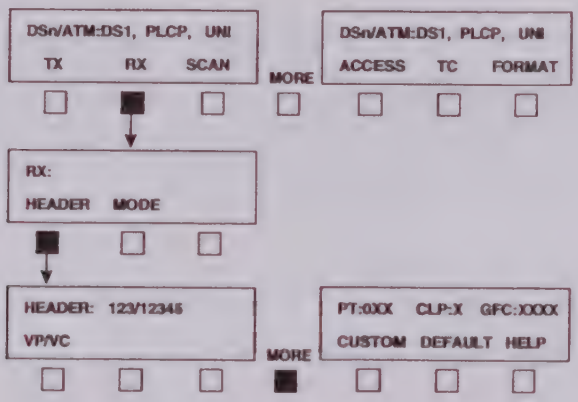


Figure 3-30. HEADER Menu Display

CUSTOM — Pressing this softkey enables the user to customize header masking of the PTI, CLP, and GFC fields. Acceptable mask values are binary '1' and binary '0' or "Don't Care". These values are entered via the keypad. The "don't care" value, displayed as an 'X', is entered via the decimal point button on the numeric keypad.

DEFAULT — Pressing this softkey sets the header mask to the default value (i.e. PTI = 0XX, CLP = X, and GFC = XXXX). A 0 (zero) in the MSB of the PTI field excludes F5 OAM cell from the selected analysis mode.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

VP/VC Submenu

VP/VC — Pressing this softkey displays the VP/VC submenu. The VP/VC submenu, illustrated in Figure 3-31, enables the user to enter the VPI/VCI field of the header for the receive cell stream of interest (to be analyzed). The menu displays the currently selected VPI/VCI. Three menu selections — FILTER, NEXT, and HELP are visible on the bottom line of the display.

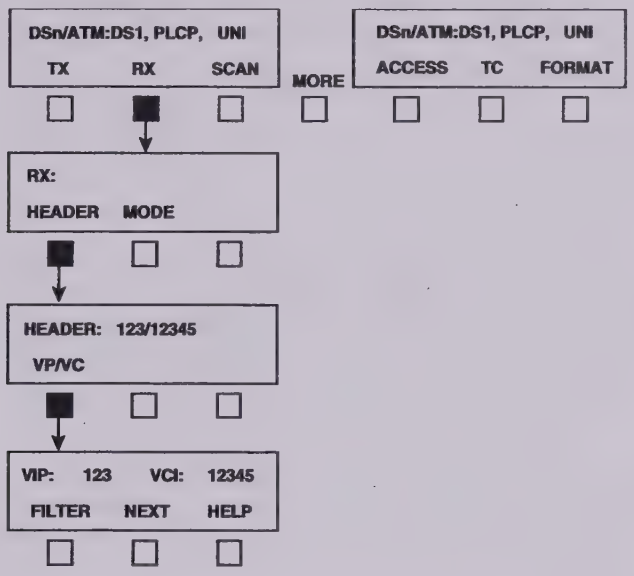


Figure 3-31. VP/VC Submenu Display

FILTER — Pressing this softkey enables the user to specify the VP/VC filtering used for receiving ATM cells. The options for this parameter are: filter on a specific VPI/VCI (i.e. display shows VPI: 123 VCI: 12345), filter on a specific VPI (without regard to VCI, — display shows VPI: 123 VCI: ALL), and no filtering at all (all cells are received and analyzed — display shows VPI: ALL VCI: ALL). Repeatedly pressing the FILTER softkey cycles through the available options. The VPI/VCI may be entered via the keypad, the entry is in decimal format.

NEXT — Pressing this softkey selects the next VPI/VCI combination in the Active Cell Scan list (see subsection 3.4.6).

HELP — Pressing this softkey provides information on the preceding two softkey functions.

MODE Menu

MODE — Pressing this softkey displays the Analysis MODE menu. The MODE menu, illustrated in Figure 3-32, displays the current analysis mode. Three menu selections — AUTO, TEST, and CRTD are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch once displays three additional menu items —AAL, OAM, and GNERIC. Pressing the **MORE** switch a second time displays an additional three menu items — UPC C, UPC V, and CDV.

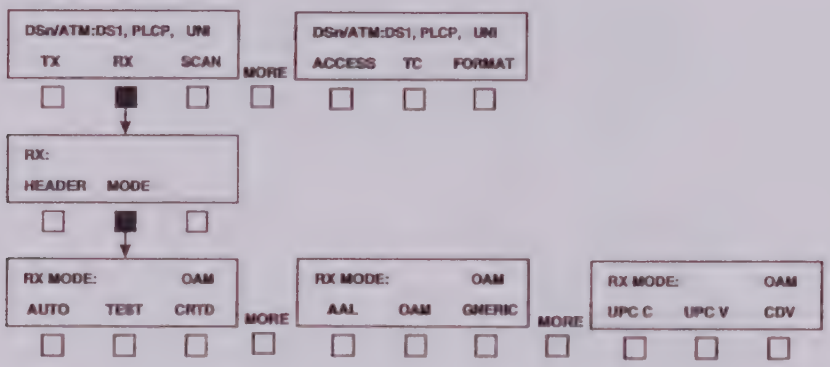


Figure 3-32. MODE Menu Display

AUTO — Pressing this softkey causes the interface to attempt to detect the type of cell traffic on the VPI/VCI specified in the HEADER submenu of the RX menu. If the cell type is detected successfully, the interface automatically sets the test mode to one of five modes: TTC1, TTC4, AAL1, AAL 3/4, or AAL5 and updates the MODE display accordingly. If cell type detection is unsuccessful, GENERIC test mode is set and the interface updates the MODE display.

NOTE

AUTO mode is not operational when ALL is selected in the HEADER submenu of the RX menu. A warning message is displayed.

TEST — Pressing this softkey places the interface in one of two TEST cell mode, TTC1 or TTC4. All non-unassigned, received cells are expected to have a TTC preamble (see Table 3-1 for a description of the TTC4 test cell format). TTC4 mode enables the counting of lost cells, misinserted cells, sequence errors and payload verification. TTC1 mode is similar, but payload verification is not supported (see Table 3-2). Each time the TEST softkey is pressed, the next TEST mode is selected.

CRTD — Pressing this softkey places the interface in cell round trip delay (CRTD) mode. All non-unassigned, received cells are expected to be TTC test cells generated by the same FIREBERD 6000. This mode enables the determination of the cell round trip delay through the network via a remote loopback.

AAL — Pressing this softkey places the interface in AAL analysis mode. Each time the AAL softkey is pressed, the next AAL type in the list is selected (AAL1, AAL3/4, or AAL5). This mode enables the accumulation of data on Segmentation and Reassembly Protocol Data Unit (SAR PDU) and Convergence Sublayer Protocol Data Unit (CS PDU) errors for AAL1, AAL 3/4, and AAL5.

OAM — Pressing this softkey places the interface in OAM cell analysis mode. All cells matching the VPI/VCI of the receive header filter are assumed to be OAM cells. Any OAM cell not found to be an AIS, RDI (FERF) or LOOPBACK OAM cell are counted as F4 OTHER or F5 OTHER.

NOTE

To receive all OAM cells on a VP (F4 flows), set the VPI in the receive header filter to the VP of interest and the VCI to ALL. To receive all OAM cells on a VC (F5 flows), set the VPI and the VCI in the receive header filter to the VPI/VCI of interest.

GENERIC — Pressing this softkey places the interface in GENERIC (AAL0) cell analysis mode. No specific cell type or AAL is expected. This mode enables collection of generic statistics at the ATM layer for the received cell stream.

NOTE

To exclude F5 OAM cells from the selected analysis ensure that the most significant bit (MSB) in the PTI field of the receive header is set to 0 (zero).

UPC C Submenu

UPC C — Pressing this softkey places the interface in UPC C (Usage Parameter Control — Constant Bit Rate) analysis mode and displays the UPC C submenu, which enables usage parameter control analysis of constant bit rate traffic. The UPC C submenu, illustrated in Figure 3-33 displays the parameter controls in use for constant bit rate (CBR) traffic. Three menu selections — PCR, CDVt and HELP are visible on the bottom line of the display. The HELP softkey provides information on the PCR and CDVt softkeys.

This mode may be used to measure ATM usage for CBR (constant bit rate) service. A count of non-conforming cells is available (as PCR NONC under the FIREBERD 6000 Analysis Results), using a single "leaky bucket", per the GCRA (generic cell rate algorithm) as discussed in the ATM Forum UNI Specification V.3.1. A non-conforming cell is defined as any cell that causes the "leaky bucket", as governed by the PCR and the CDVt, to be exceeded.

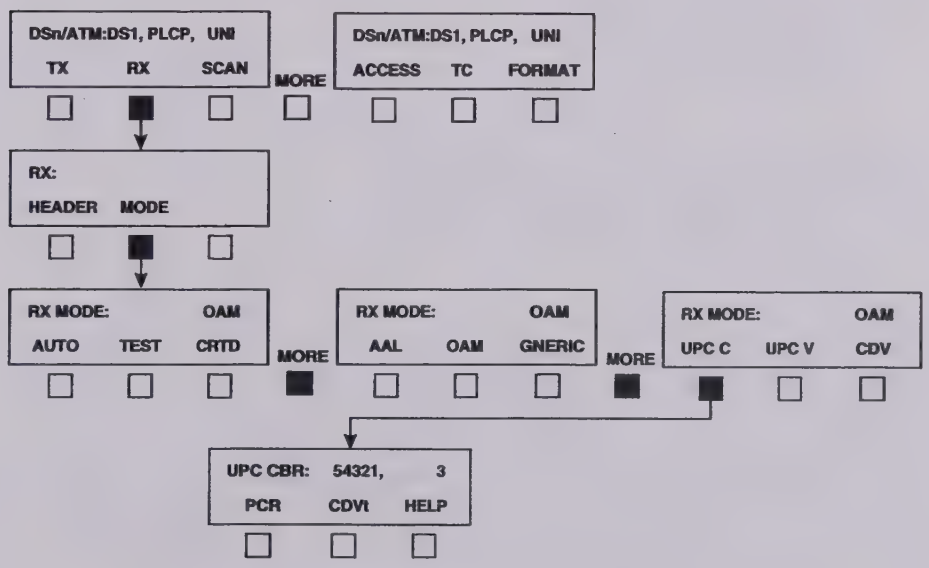


Figure 3-33. UPC C Submenu Display

PCR — Pressing this softkey places the data entry cursor under the PCR (peak cell rate), enabling entry of the expected PCR value in cell per second via the keypad. PCR is used to calculate PEI (peak emission interval) which is used in the "leaky bucket" algorithm.

CDVt — Pressing this softkey places the data entry cursor under the CDVt (cell delay variation tolerance), enabling entry of the desired CDVt value in cell times via the keypad. CDVt is used as the "bucket" depth in the "leaky bucket" algorithm.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

UPC V Submenu

UPC V — Pressing this softkey displays the UPC V (Usage Parameter Control — Variable Bit Rate) submenu, which enables usage parameter control analysis of variable bit rate traffic. The UPC-V submenu, illustrated in Figure 3-34 displays the parameter controls in use for variable bit rate (VBR) traffic. Three menu selections — PCR, CDVt and HELP are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays three additional menu items —SCR, MBS (maximum burst size) and HELP.

This mode may be used to measure ATM usage for VBR (variable bit rate) service. A count of non-conforming cells is available (as TAG CELL and as PCR NONC under the FIREBERD 6000 Analysis Results), using dual "leaky buckets", per the GCRA as discussed in the ATM Forum UNI Specification V.3.1. A PCR NONC cell is defined as any cell that causes the "bucket" as governed by the PCR and the CDVt to be exceeded. A TAG CELL is defined as any high priority cell (CLP = 0) that causes the "bucket" as governed by the SCR and the sum of the CDVt and Bt to be exceeded. PCR NONC cells from the "PCR Bucket" calculation will not be included in the "SCR Bucket" calculation. Bt (burst tolerance) is defined per the GCRA as:

$$Bt = (MBS - 1)(1/SCR - 1/PCR)$$

where: Bt = burst tolerance
MBS = maximum burst size
SCR = sustained cell rate
PCR = peak cell rate

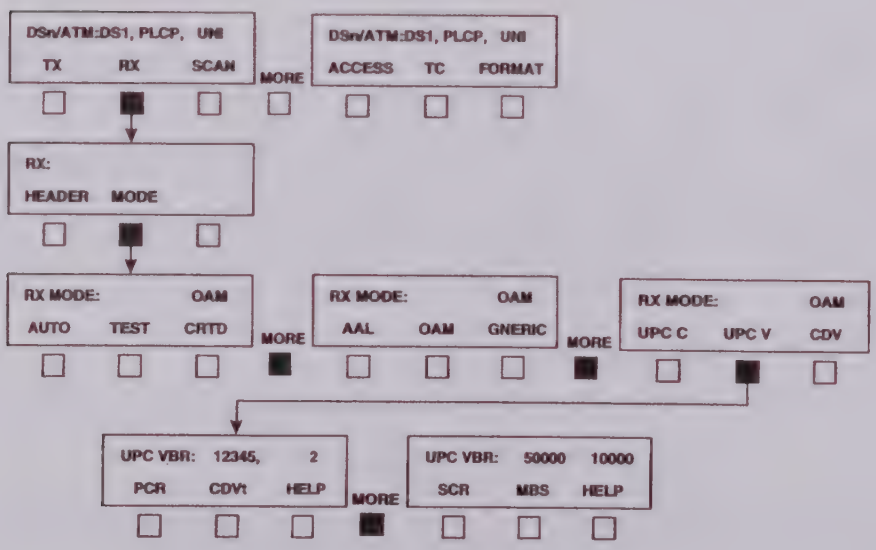


Figure 3-34. UPC-V Submenu Display

PCR — Pressing this softkey places the data entry cursor under the PCR enabling entry of the expected PCR value in cells per second via the keypad. PCR is used to calculate PEI which is used in the "leaky bucket" algorithm.

CDVt — Pressing this softkey places the data entry cursor under the CDVt enabling entry of the desired CDVt value in cell times via the keypad. CDVt is used as the "bucket" depth in the "leaky bucket" algorithm.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

SCR — Pressing this softkey places the data entry cursor under the SCR (sustained cell rate) enabling entry of the expected SCR value in cells per second via the keypad. SCR is used to calculate SEI (sustained emission interval) which is used in the "leaky bucket" algorithm.

MBS — Pressing this softkey places the data entry cursor under the MBS (maximum burst size) enabling entry of the MBS value in cells via the keypad. MBS is used to calculate Bt in the "leaky bucket" algorithm.

HELP — Pressing this softkey provides information on the preceding two softkey functions.

CDV Submenu

CDV — Pressing this softkey place the interface in CDV (Cell Delay Variation) analysis mode and displays the CDV submenu, which enables cell delay variation measurement on cells that match the RX header filter. A measurement of peak-to-peak CDV (PP CDV under the FIREBERD 6000 Analysis Results) on the incoming cell stream is provided. PP CDV is defined as the difference between the maximum CDV and the minimum CDV. The CDV submenu, illustrated in Figure 3-35 displays the currently selected cell delay variation value. Two menu selections — PCR and HELP are visible on the bottom line of the display.

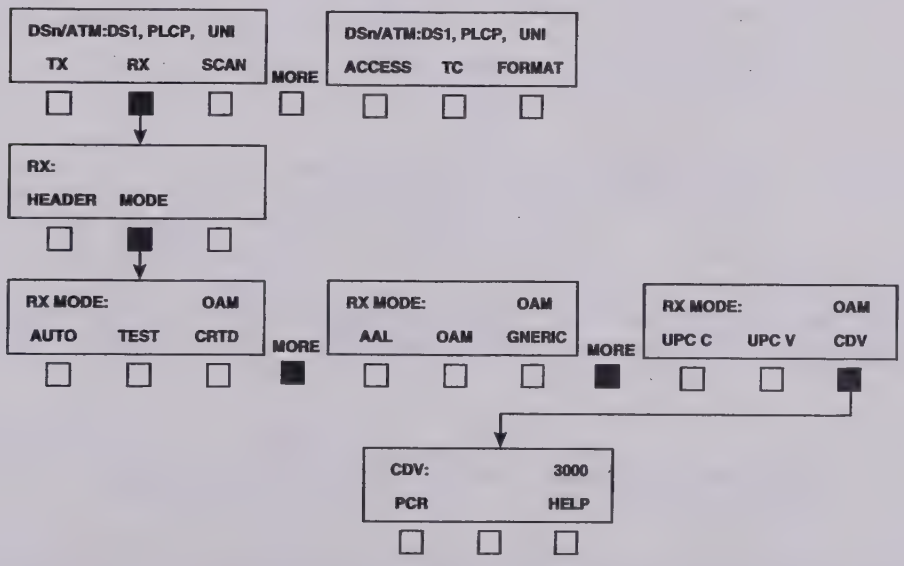


Figure 3-35. CDV Submenu Display

PCR — Pressing this softkey places the data entry cursor under the PCR enabling entry of the expected PCR value in cells per second via the keypad.

HELP — Pressing this softkey provides information on the preceding softkey function.

3.4.6 SCAN Menu

SCAN — Pressing this softkey displays the SCAN menu. The SCAN menu, illustrated in Figure 3-36, enables the user to monitor and record an entire receive link for the first 32 active VPI/VCI combinations observed on the link, and stores them in the SCAN List. The stored VPI/VCI combinations can then be selectively recalled and used in defining transmit stream headers and receive filter headers. The menu displays the current scan status. Three menu selections — START, VP/ALL, and LIST are visible on the bottom line of the display. The LED within the **MORE** switch also is illuminated, indicating there are more menu selections than those displayed. Pressing the **MORE** switch displays one additional menu item — HELP.

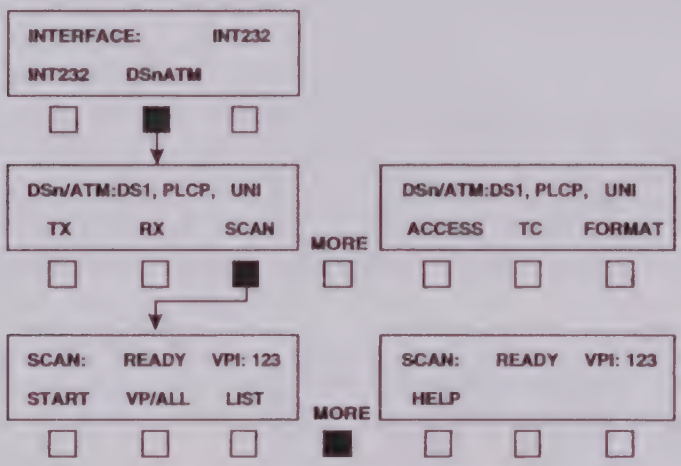


Figure 3-36. SCAN Menu Display

START — Pressing this softkey starts the scan function. When the FIREBERD 6000 is scanning, the top line of the display will appear as "SCANNING... VPI:123", and the softkey changes START to STOP. Pressing the STOP softkey will stop the scan, and the display will then appear as "SCAN: READY VPI: 123". While a scan is in progress, all other softkeys do not appear in the display.

NOTE

When scanning is active all ATM and AAL layer results are unavailable.

VP/ALL — Pressing this softkey toggles the scan function between the 'specific VPI scan mode' (the specific VPI is entered via the numeric keypad and appears on the status line of the display) and the 'all VPI scan mode' (ALL appears on the status line of the display). Scanning all VPIs generates a list of all the active VPI/VCIs on the link, while scanning a specific VPI generates a list of all active VCIs in the selected VPI.

LIST Submenu

LIST — Pressing this softkey displays the LIST submenu. The LIST submenu, illustrated in Figure 3-37 displays all of the unique VPI/VCI combinations (up to 32) detected during the scan. Two menu selections — NEXT and CLRALL are visible on the bottom line of the display.

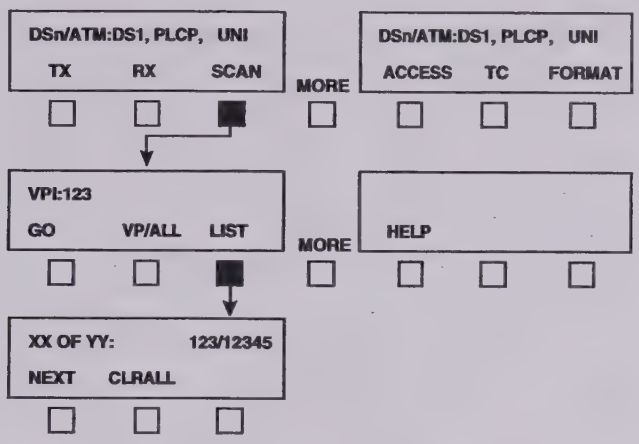


Figure 3-37. LIST Submenu Display

The top line of the display indicates the VPI/VCI (123/12345), its position in the scan list (XX), and the total number of VPI/VCIs in the scan list (YY).

NEXT — Pressing this softkey displays the next VPI/VCI in the scan list, wrapping to the first scan list entry when required.

CLRALL — Pressing this softkey clears the contents of the scan list.

NOTE

The Test RESTART function does not clear the Scan List, but the CLEAR NOVRAM function (Auxiliary Function 43) does clear the Scan List.

If the Scan List has been cleared or no scan has been previously performed, this menu will not appear; instead the message "Scan List is Empty" will appear.

3.5 FIREBERD 6000 ANALYSIS RESULTS

Table 3-3 through Table 3-7 describe the analysis results that are displayed when the DS1/DS3 ATM Interface Module is installed in the FIREBERD 6000. Refer to the FIREBERD 6000 Reference Manual for results not described in this section.

Table 3-3. ERROR Category Analysis Results

Mode(s)	Displayed Result	Description
AAL3/4, AAL5, AAL1	AAL CRC	AAL3/4 CRC-10 or AAL5 CRC-32 Error Count or AAL1 Sequence Number Protection Error Count (VPI/VCI must be set to a specific value to display result).
AAL3/4, AAL5	AVG CPDU	AAL3/4 or AAL5 Average CS PDU Length (VPI/VCI must be set to a specific value to display result).
AAL3/4, AAL5	LEN ERR	AAL3/4 or AAL5 CS PDU Length Error Count (VPI/VCI must be set to a specific value to display result).
AAL3/4, AAL5	CPDU RT	AAL3/4 or AAL5 Average CS PDUs per Second (VPI/VCI must be set to a specific value to display result).
AAL3/4	LI ERR	AAL3/4 SAR PDU Length Indicator Error Count (VPI/VCI must be set to a specific value to display result).
AAL3/4, AAL5	TOT CPDU	AAL3/4 or AAL5 CS PDU Count (VPI/VCI must be set to a specific value to display result).
TEST, CRTD	SEQ ERR	TTC Sequence Number out of sequence error count (Out-of-Service Testing) (VPI/VCI must be set to a specific value to display result).
CRTD, TEST, AAL1, AAL3/4	LST CEL%	ATM Cell Loss Ratio is the ratio of lost cells to total cells transmitted.
UPC C, UPC V	PCR NONC	A count of cells that have exceeded the user specified PCR and CDVt (see Section 3.4.5).
UPC V	TAG CELL	A count of high priority cells (CLP = 0) that have exceeded the user specified SCR and sum of CDVt and MBS (see Section 3.4.5).
CDV	PP CDV	A measure of the maximum peak-to-peak cell delay variation (CDV) on the actual incoming cell stream versus the expected incoming cell stream (see Section 3.4.5).
All Modes	CLP CELL	A count of received cells which have the CLP (cell loss priority) set to 1.
All Modes	CLP%	Percentage of received cells which have the CLP (cell loss priority) set to 1.
Generic	F4 OAM	Count of F4 OAM cells received.
OAM	F4 AIS	Count of F4 Alarm Indication Signal OAM cells.
OAM	F4 RDI	Count of F4 Remote Defect Indication (FERF) OAM cells.
OAM	F4 SLOOP	Count of F4 Segment Loopback OAM cells.
OAM	F4 ELOOP	Count of F4 End-to End Loopback OAM cells.
OAM	F4 OTHER	Count of unknown F4 cells.
Generic	F5 OAM	Count of F5 OAM cells received.
OAM	F5 AIS	Count of F5 Alarm Indication Signal OAM cells.
OAM	F5 RDI	Count of F5 Remote Defect Indication (FERF) OAM cells.
OAM	F5 SLOOP	Count of F5 Segment Loopback OAM cells.
OAM	F5 ELOOP	Count of F5 End-to End Loopback OAM cells.
OAM	F5 OTHER	Count of unknown F5 cells.
CRTD, TEST, AAL1, AAL3/4	LST CELL	ATM Lost Cell Count (VPI/VCI must be set to a specific value to display result).

Table 3-3. ERROR Category Analysis Results (Continued)

Mode(s)	Displayed Result	Description
CRTD, TEST	MIS CELL	Misinserted or non-FIREBERD 6000 generated ATM cell count (VPI/VCI must be set to a specific value to display result).
AAL3/4, OAM, TEST, CRTD	CEL ERR	ATM Cell Payload Error Count.
AAL3/4, OAM, TEST, CRTD	CEL ERR%	ATM Cell Payload Error ratio is the ratio of errored cells to the sum of successfully transferred cells and errored cells.
All Modes	TOT CELL	ATM Cell Total Count (counts only those cells that pass through the receive header filter).
All Modes	TOT IDLE	ATM Unassigned Cell Count. Unassigned cells are those with VPI/VCI = 0/0 and Payload = 6A (repeated to end of cell) for both UNI and NNI formats.

Table 3-4. PERFORMANCE Category Analysis Results

Mode(s)	Displayed Result	Description
All Modes, (Except OAM)	MAX GAP	ATM Maximum Inter-cell Gap in cell slots measured from the start of one valid cell to the start of the next valid cell in the receive cell stream (VPI/VCI must be set to a specific value to display result).
CRTD	MAX CRTD	Maximum Cell Round Trip Delay in milliseconds (VPI/VCI must be set to a specific value to display result).
All Modes	MAX TPUT	ATM Maximum Cell Throughput in cells per second (valid only for those cells that pass through the receive header filter).
All Modes	MAX%UNA	ATM Maximum Unassigned Cell Percentage (per second).
All Modes	MAX%UTIL	ATM Maximum Line Utilization Percentage (per second, valid only for those cells that pass through the receive header filter).
All Modes (Except OAM)	MIN GAP	ATM Minimum Intercell Gap in cell slots measured from the start of one valid cell to the start of the next valid cell in the receive cell stream (VPI/VCI must be set to a specific value to display result).
CRTD	MIN CRTD	Minimum Cell Round Trip Delay in milliseconds (VPI/VCI must be set to a specific value to display result).
All Modes (Except OAM)	AVG GAP	ATM Average Intercell Gap in cell slots measured from the start of one valid cell to the start of the next valid cell in the receive cell stream (VPI/VCI must be set to a specific value to display result).
CRTD	AVG CRTD	Average Cell Round Trip Delay in milliseconds (VPI/VCI must be set to a specific value to display result).
All Modes	AVG TPUT	ATM Average Cell Throughput in cells per second (valid only for those cells that pass through the receive header filter).
All Modes	AVG%UNA	ATM Average Unassigned Cell Percentage (per second).
All Modes	AVG%UTIL	ATM Average Line Utilization Percentage (valid only for those cells that pass through the receive header filter).

Table 3-5. SIGNAL Category Analysis Results

Mode(s)	Displayed Result	Description
All Modes	GEN FREQ	Generator frequency.
All Modes	RCV FREQ	Receiver frequency.

Table 3-6. T-CARRIER Category Analysis Results

Mode(s)	Displayed Result	Description
All Modes	CPAR ERR	Accumulated DS3 CBIT Parity Errors.
All Modes	OCD SEC	Out of Cell delineation seconds (valid only when TC alignment is set to HEC).
All Modes	FEBE	Accumulated DS3 Far End Block Errors (FEBEs).
All Modes	FRA ERR	Accumulated DS3 (F & M-Bit) frame errors, or DS1 frame errors.
All Modes	LCV	Accumulated DS3 Line Code Violations (LCVs).
All Modes	PAR ERR	Accumulated DS3 P-Bit Parity errors.
All Modes	RCV FEAC	Received Far End Alarm Condition.
All Modes	BPVs	Accumulated DS1 Bipolar Violations.
All Modes	CRC ERR	Accumulated DS1 ESF CRC errors.
All Modes	FRA LOSS	Accumulated DS3 or DS1 frame loss events.
All Modes	BIP8	Physical Layer Convergence Protocol (PLCP) BIP-8 Error Count (result blanked when TC ALIGN set to HEC).
All Modes	HEC COR	Accumulated correctable Header Error Check (HEC-C) errors.
All Modes	HEC UNC	Accumulated Uncorrectable Header Error Check- (HEC-U) errors.
All Modes	PLC FEBE	Accumulated PLCP FEBE (result blanked when TC ALIGN set to HEC).
All Modes	PLCP FAS	Accumulated PLCP Frame Alignment Signal (FAS) Errors (result blanked when TC ALIGN set to HEC).
All Modes	PLCP LOF	Accumulated PLCP Loss of Frame (LOF) events (indicates PLCP OOF state has been active for 8 consecutive PLCP frames).
All Modes	PLCP OOF	Accumulated PLCP Out of Frame (OOF) events (result blanked when TC ALIGN set to HEC).
All Modes	UNC ERR%	Uncorrectable HEC Error Ratio is the percentage of uncorrectable HEC errored cells over total cells, where total errored cells is defined as: HEC UNC. Total cells is calculated as (TOT CELL)+(HEC UNC).

Table 3-7. ALARM Category Analysis Results

Mode(s)	Displayed Result	Description
All Modes	AIS SEC	Count of seconds in which a DS1 or DS3 AIS (blue alarm) was detected.
All Modes	SIG LOSS	Accumulated DS3 signal events.
All Modes	PLCY SEC	Seconds during which a PLCP YELLOW alarm was detected.
All Modes	YEL SEC	Count of seconds in which a YELLOW alarm was detected in the DS1 and DS3 framing bits.

3.6 INTERFACE STATUS INDICATORS

The DS1/DS3 ATM Interface Module uses the SYNC, FRM SYNC, CODE, ALM1, and ALM2 LEDs as status indicators, as shown in Table 3-8.

Table 3-8. DS1/DS3 ATM Interface Status Indicators

The Status Indicator:	Illuminates When:
SYNC	A valid cell stream is being maintained on the receive circuit.
FRM SYNC	The DS1/DS3 ATM Interface Module has synchronized to the appropriate DS1 or DS3 framing format.
CODE	The IDLE signal is received in the DS3 FEAC while the equipment is operating in DS3 mode or B8ZS line code detected in DS1 mode.
ALM1	A DS1 or DS3 yellow alarm is received.
ALM2	A DS1 or DS3 AIS (blue alarm) signal is received.

3.7 FIREBERD 6000 PRINTER OPERATION

Figure 3-38 and Figure 3-39 respectively depict a typical DS1/DS3 ATM Interface Module Controls and Results printout. Refer to the *FIREBERD 6000 Reference Manual* for printer set-up and operating instructions.

```
CONTROLS          PRINT
13:55:45    03 OCT 95   SITE:              Alpha
DATA:             2^15-1  ERROR INS:         OFF  SELF LOOP:          ON  GEN CLOCK:       SYNTH
TIMING MODE:         N/A  SYN FRQ:     8.956 kHz  INTERFACE:             DS1/DS3 ATM
ACCESS:              DS3  FRAMING:          CBIT  OUTPUT:             DSX  LOOPBACK:       NORMAL
ALIGNMT:             HEC  SCRMBL:             ON  TIMING:            LOOP  FEBE:             ONES
ALARM:               OFF  ERROR TYPE:     HEC-U  ERROR RATE:        1E-5  FORMAT:             UNI
MODE:            GENERIC  TX:              ACTIVE  PRIMARY TX CHAN:        VP/VC:       111/11111
PT:                  111  CLP:                 1  GFC:                1111  PAYLOAD:            6A
SCR RATE:          20854  SCR UTIL:           20%  PCR RATE:          31361  PCR UTIL:           30%
PCR MBS:            1000  OAM:     AIS,E-TO-E,F4  BKGD 1 TX CHAN:         VP/VC:       222/22222
PT:                  010  CLP:                 1  GFC:                0101  PAYLOAD:            6A
FIXED RATE:        26067  FIXED UTIL:         25%  BKGD 2 TX CHAN:         VP/VC:       234/23456
PT:                  101  CLP:                 0  GFC:                1010  PAYLOAD:            6A
FIXED RATE:        31361  FIXED UTIL:         30%  RX CHAN:                VP/VC:         222/ALL
RX MASK:         DEFAULT  PT:                0XX  CLP:                   X  GFC:              XXXX
UPC CBR:               0  CBR CDVT:            0  UPC VBR:               0  VBR CDVT:              0
VBR SCR:               0  VBR MBS:             0  CDV PCR:               0  TEST INT:     00:00:10
PRINT EVENT:        NORM  TEST INT PRNT:     OFF  SYNC LOSS PRNT:     OFF  ERROR PRNT:          ON
1-BIP8                    TIME PRNT:          OFF  ANALY MODE:          CON  DISPLAY HOLD:       OFF
BLOCK LENGTH:             1000 BITS                              DELAY:      DTR/ DTR/XON CHARAC-
TER:                  11
XOFF CHARACTER:       13  AUX FUNC IN USE:        NONE                      PRINT SPEED:       FAST
PRINT TERM:        CR LF  REMOTE:             NONE  PRINTER:         RS-232  RS-232:
DATA BITS:             8  BAUD:               9600  PARITY:            NONE
```

Figure 3-38. Example Controls Printout

```
MANUAL            PRINT
16:01:29    03 OCT 95   SITE ID          Alpha  LCV                  0  FRA ERR              0
PAR ERR                0  CPAR ERR             0  CPE S A              0  CPE S B              0
CPE S C                0  FEBE                 0  FEBE S A             0  FEBE S B             0
FEBE S C               0  RCV FREQ      44736420  GEN FREQ      44736420  RCV FEAC       DS3 OOF
FRA LOSS               0  SIG LOSS             0  YEL SEC              0  AIS SEC              0
ELAP SEC              87  ELAP TIM      00:01:27  FRAME SYNC PRESENT       IDLE SIGNAL         NO
YELLOW ALARM          NO  BLUE SIGNAL         NO  SELF LOOP           ON  IF          DS1/DS3 ATM
SEQ ERR                0  MIS CELL             0  LST CELL             0  LST CEL%         0.00%
TOT CELL         2709694  CEL ERR              0  CEL ERR%         0.00%  CLP CELL             0
CLP %              0.00%  MIN GAP              3  MAX GAP              4  AVG GAP          3.325
MAX TPUT(ATM)                              31363  AVG TPUT(ATM)                         31362.2
MAX%UTIL(ATM)                              30.08%  AVG%UTIL(ATM)                        30.08%
MAX %UNA          69.92%  AVG %UNA         69.92%  HEC COR              0  HEC UNC              0
UNC ERR%           0.00%  OCD SEC              0
```

Figure 3-39. Example Results Printout

3.8 AUXILIARY FUNCTIONS

No additional auxiliary functions are implemented by the DS1/DS3 ATM Interface Module. The current FIREBERD 6000 auxiliary functions remain functional with the following exceptions, as detailed in Table 3-9.

Table 3-9. Auxiliary Function Exceptions

Aux Function	Status
Generator Clock Polarity (AUX1)	Not Applicable — a warning message is displayed when this function is selected.
Receiver Clock Polarity (AUX2)	Not Applicable — a warning message is displayed when this function is selected.
Receiver action on Sync Loss (AUX3)	Not Applicable — a warning message is displayed when this function is selected.
Single Transmit (AUX4)	Affects primary channel only, background channels continue to transmit normally. The interface transmits one cell each time the **RESTART** switch is pressed, the cell format is that specified by the user.
Generator Data Inversion (AUX6)	Not Applicable — a warning message is displayed when this function is selected.
Receiver Clock Source (AUX7)	Not Applicable — a warning message is displayed when this function is selected.
Out of Band Flow Control (AUX8)	Not Applicable — a warning message is displayed when this function is selected.
In Band Flow Control (AUX9)	Not Applicable — a warning message is displayed when this function is selected.
Receiver Sync Loss Threshold (AUX10)	Not Applicable — a warning message is displayed when this function is selected.
Frame Relay (AUX12)	The DS1/DS3 ATM Interface does not support frame relay. A message indicating incompatible interface is displayed when this function is selected.
BERT Format (ANSI or ITU-T) (AUX 20)	Not Applicable — a warning message is displayed when this function is selected.
Block Length (AUX 30)	Not Applicable — a warning message is displayed when this function is selected.
Signal Delay (AUX 31)	Not Applicable — a warning message is displayed when this function is selected.
Common Frequencies (AUX 32)	Not Applicable — a warning message is displayed when this function is selected.
User Pattern (AUX41)	Not Applicable — a warning message is displayed when this function is selected.

SECTION 4 INTERFACE SPECIFICATIONS

4.1 INTRODUCTION

This section contains the interface specifications for the DS1/DS3 ATM Interface. This information is listed in Tables 4-1 and 4-2.

Table 4-1. DS1 Specifications

Item		Specification
Framing Modes:		D4 or ESF
Operating Modes:		Normal (originate) Line loopback Self loopback
T1 Input:	Frequency:	1.544 MHz ±100 ppm
	Line Termination:	TERM = 100 Ω ± 5% DSX-MON = 100 Ω ± 5% BRIDGE = 1000 Ω minimum
	Recovery range:	TERM = +6 to -35 dBdsx cable loss DSX-MON = -10 to -30 dBdsx resistive loss
	Jitter Tolerance:	Complies with Bell Technical Reference PUB 62411-1985
	Line Codes:	AMI B8ZS
T1 Output:		
	Clock Sources:	Recovered (from receiver) External (via interface front panel BNC connector) Internal (1.544 MHz ± 5 ppm oscillator)
	LBO Options:	0, -7.5, -15, -22.5 dB ± 1 dB at 772 kHz
	Output Pulse:	per: AT&T PUB 41541
	Pulse Amplitude:	3.0V ± 5% into 100 Ω
Indicators:		
	FRM SYNC LED	DS1 frame synchronization achieved
	ALM1 LED	Yellow alarm received
	ALM2 LED	Alarm Indication Signal (AIS) received
	CODE LED	B8ZS line code detected
Error Insertion Types:		
	HEC-C (correctable)	Single or rate
	HEC-U (uncorrectable)	Single or rate
	PLCP BIP-8	Single or rate
Error Insertion Rate:		1E-3 to 1E-6

Table 4-1. DS1 Specifications (Continued)

Item	Specification
Alarm Criteria:	
Yellow Alarm	Detects in D4 framing: 0 in bit 2 of all channels for 256 or consecutive channels. Detects in ESF framing: a repeating pattern of 00h, FFh in the ESF Data Link.
Alarm Indication Signal (AIS)	Detects when two consecutive frames have less than 3 zeroes total (excluding framing bits) and DS1 framing is lost.

Table 4-2. DS3 Specifications

Item	Specification
Framing Modes:	M13 or C-bit Parity Framing on Receive C-Bit Parity on Transmit
Operating Modes:	Normal (originate) Line loopback Self loopback
T3 Input:	
Frequency:	44.736 MHz ± 100 ppm
Line Termination:	75 ohms
Input Modes:	Receives DSX HIGH level (e.g. 1.0 V DSX level (0.36V to 0.85V) conforming to pulse shape template defined by ANSI T1.102-1987 signals
Data Recovery range:	0 to 450 feet of 728A coaxial cable and 0 to 23 dB resistive attenuation
Line Codes:	B3ZS
T3 Output	
Clock Sources:	Recovered (from receivers) External (via front panel BNC connector) Internal (44.736 MHz ± 15 ppm oscillator)
LBO Options:	0 or simulated 450 feet of 728A coaxial cable
Output Pulse:	per: ANSI T1.102-1987 BELLCORE TR-TSY-000499
Pulse Amplitude:	HIGH = .0.95V ±5% peak, rectangular DSX = 0.77V ±5% peak, conforming to pulse template in T1.102-1987
Indicators:	
FRM SYNC LED	DS3 frame synchronization achieved
ALM1 LED	Yellow alarm received
ALM2 LED	Blue alarm received
CODE LED	Idle signal received

Table 4-2. DS3 Specifications (Continued)

Item	Specification
Error Insertion Types:	
HEC-C (correctable)	Single or rate
HEC-U (uncorrectable)	Single or rate
PLCP BIP-8	Single or rate
Error Insertion Rate:	1E-3 to 1E-6
Alarm Criteria:	
Yellow Alarm	Detects when any pair of received X-bits in a DS3 frame are set to zero
Blue Alarm (AIS)	Detects when a frame-aligned 1010 pattern is received with all C bits in the DS3 frame are equal to zero

SECTION 5 MAINTENANCE AND SERVICE

5.1 INTRODUCTION

This section contains information on maintenance and service for the DS1/DS3 ATM Interface Module. It also describes TTC's warranty policies and repair procedures.

5.2 MAINTENANCE

5.2.1 In Case of Difficulty

If the interface fails to operate and no front panel indicators illuminate, check the following:

- The FIREBERD 6000 AC line power and AC power supply
- AC fuses and fuse rating

If some indicators illuminate but the unit fails to operate:

- Verify that the interface is inserted into the FIREBERD 6000 properly (turn power OFF before inserting or removing the interface).
- Check the interface and/or mainframe cabling and connections.
- Substitute another interface, if available.

Follow the self-test procedures in the FIREBERD 6000 Operating Manual to localize the problem. If the unit still does not operate, refer to the sections that immediately follow for service information or call the TTC Customer Service Department for applications assistance.

5.3 SERVICE

5.3.1 Warranty Policy

All equipment manufactured by Telecommunications Techniques Corporation (TTC) is warranted against defects in material and workmanship. This warranty applies only to the original purchaser and is non-transferable unless express written authorization of the warranty transfer is granted by TTC.

Liability under this warranty extends only to the replacement value of the equipment. The warranty is void under the following conditions.

(1) Equipment has been altered or repaired without specific authorization from TTC.

(2) Equipment is installed or operated other than in accordance with instructions contained in TTC literature and operating manuals.

No other warranty is expressed or implied. TTC is not liable for any direct, indirect, incidental, or consequential damages.

5.3.2 In-Warranty Service

Equipment in warranty must be returned to the factory or authorized service center with shipping prepaid. The equipment should be packed and shipped in accordance with instructions in Section 5.3.4, Equipment Return Instructions. Before returning any equipment, the customer must obtain a Return Authorization (RA) number by contacting the nearest TTC Repair Center. The RA number should appear on all paperwork and be clearly marked on the outside of the shipping container.

After the equipment is repaired by TTC, it is tested to applicable specifications and returned to the customer with shipping prepaid. A brief description of the work performed and the materials used is provided on the Equipment Repair Report furnished with the returned equipment.

5.3.3 Out-of-Warranty Service

The procedure for repairing out-of-warranty equipment is the same as the one used for equipment still in warranty. However, there is a minimum charge applied to each request for out-of-warranty service. The minimum charge guarantees the customer an estimate of the repair costs and is used as credit against actual materials and labor costs should the equipment be repaired. Contact the TTC Repair Department for specific information on the minimum out-of-warranty repair charge.

The customer will be billed for parts plus standard labor rates in effect at the time of the repair. The customer will also be required to furnish a purchase order number before repair work can be started, and a hard copy of the purchase order must be received by TTC before the repaired equipment may be shipped to the customer. A description of the labor and materials used is provided in the Equipment Repair Report.

Once an out-of-warranty repair is made, the repaired part or component is warranted for one (1) year. This warranty applies only to the part or component that was repaired; other parts or components are not covered under the one (1) year repair warranty.

5.3.4 Equipment Return Instructions

To all equipment returned for repair, attach a tag that includes the following information.

(1) Owner's name and address.

(2) A list of the equipment being returned and the applicable serial number(s).

(3) A detailed description of the problem or service requested.

(4) The name and telephone number of the person to contact regarding questions about the repair.

(5) The Return Authorization (RA) number.

If possible, return the equipment using the original shipping container and material. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit; when needed, appropriate packing materials can be obtained by contacting TTC's Repair Department. TTC is not liable for any damage that may occur during shipping. The customer should clearly mark the TTC-issued RA number on the outside of the package and ship it prepaid and insured to TTC.

APPENDIX A FACTORY DEFAULT SETTINGS

A.1 INTRODUCTION

Table A-1 contains the factory default setting for the DS1/DS3 ATM Interface Module.

Table A-1. Factory Default Settings

Parameter	Default Value
FORMAT	UNI
ACCESS	DS1
DS1:CONFIG:FRAME	ESF
DS1:CONFIG:CODE	B8ZS
DS1:CONFIG:INPUT	TERM
DS1:CONFIG:LBO	0 dB
DS1:CONFIG:MODE	NORMAL
DS3:CONFIG:FRAME	CBIT
DS3:CONFIG:OUTPUT	DSX
DS3:CONFIG:MODE	NORMAL
TC:CONFIG:ALIGN	HEC
TC:CONFIG:SCRMBL	OFF
TC:CONFIG:TIMING	LOOP
TC:CONFIG:FEBE	ONES
TC:CONFIG:ALARM	OFF
TC:ERRINS:TYPE	HEC-C
TC:ERRINS:RATE	OFF
TX:	ACTIVE
TX:HEADER:VP/VC:PRI	0/0
TX:HEADER:VP/VC:BKDG1	0/0
TX:HEADER:VP/VC:BKDG2	0/0
TX:HEADER:PT	000 (binary)
TX:HEADER:CLP	0
TX:HEADER:GFC	0000 (binary)
TX:PAYLD:PRI	6A (hex)
TX:PAYLD:BKGD1	6A (hex)
TX:PAYLD:BKGD2	6A (hex)
TX:RATE:PR CBR:	30% (or equivalent cell rate)
TX:RATE:PR VBR:SCR	20% (or equivalent cell rate)
TX:RATE:PR VBR:PCR	30% (or equivalent cell rate)

Table A-1. Factory Default Settings (Continued)

Parameter	Default Value
TX:RATE:PR VBR:MBS (max burst size)	1000 (cells)
TX:RATE:BKGD1	0%
TX:RATE:BKGD2	0%
TX:OAM:TYPE	AIS
TX:OAM:MGMT	E-TO-E
TX:OAM:FLOW	F4
RX:HDRS:VP/VC:FILTER	ALL VPI/VCIs
RX:HDRS:PTI	0XX (binary)
RX:HEADER:CLP	X (binary)
RX:HEADER:GFC	XXXX (binary)
RX:MODE	GENERIC
RX:MODE:UPC C:PCR	0
RX:MODE:UPC C:CDVt	0
RX:MODE:UPC V:PCR	0
RX:MODE:UPC V:CDVt	0
RX:MODE:UPC V:SCR	0
RX:MODE:UPC V:MBS	0
RX:MODE:CDV:PCR	0

APPENDIX B REMOTE CONTROL COMMANDS

B.1 INTRODUCTION

Table B-1 through Table B-3 contain the remote control commands for the DS1/DS3 ATM Interface Module. Table B-4 through Table B-8 contain the remote control commands for obtaining ERROR, PERFORMANCE, T-CARRIER, SIGNAL and ALARM Category Results, respectively.

Table B-1. Remote Control Commands - Physical Layer Configuration

Command	Comments
DS1 Access	
INTF:DSnATM:DS1:FRAME [ESF|D4]	
INTF:DSnATM:DS1:FRAME?	
INTF:DSnATM:DS1:INPUT [TERM|BRDG|DSXMON]	
INTF:DSnATM:DS1:INPUT?	
INTF:DSnATM:DS1:LBO [0dB|-7.5dB|-15dB|-22.5dB]	
INTF:DSnATM:DS1:LBO?	
INTF:DSnATM:DS1:MODE [NORMAL|LLB]	Sets line loopback mode.
INTF:DSnATM:DS1:MODE?	
INTF:DSnATM:DS1:CODE:[AMI|B8ZS]	
INTF:DSnATM:DS1:CODE?	
DS3 Access	
INTF:DSnATM:DS3:FRAME [M13|CBIT]	
INTF:DSnATM:DS3:FRAME?	
INTF:DSnATM:DS3:OUTPUT [HIGH|DSX]	
INTF:DSnATM:DS3:OUTPUT?	
INTF:DSnATM:DS3:MODE [NORMAL|LLB]	Sets line loopback mode.
INTF:DSnATM:DS3:MODE?	

Table B-2. Remote Control Commands - TC Layer Configuration

Command	Comments
INTF:DSnATM:TC:ALIGN [PLCP|HEC]	
INTF:DSnATM:TC:ALIGN?	
INTF:DSnATM:TC:PLCP:TIMING [INTL|LOOP]	Only applies to DS3 access
INTF:DSnATM:TC:PLCP:TIMING?	Only applies to DS3 access
INTF:DSnATM:TC:SCRAMBLE [ON|OFF]	

Table B-2. Remote Control Commands - TC Layer Configuration (Continued)

Command	Comments
INTF:DSnATM:TC:SCRAMBLE?	
INTF:DSnATM:TC:FEBE [ZEROS|ONES|DYNAMIC]	
INTF:DSnATM:TC:FEBE?	
INTF:DSnATM:TC:ALARM [OFF|YELLOW]	
INTF:DSnATM:TC:ALARM?	
INTF:DSnATM:TC:ERRINS [OFF|SINGLE|RATE]	
INTF:DSnATM:TC:ERRINS?	
INTF:DSnATM:TC:ERRINS:TYPE [BIP_8|HEC_C|HEC_U]	
INTF:DSnATM:TC:ERRINS:TYPE?	
INTF:DSnATM:TC:ERRINS:RATE [1E-3|1E-4|1E-5|1E-6]	
INTF:DSnATM:TC:ERRINS:RATE?	

Table B-3. Remote Control Commands - ATM/AAL Layer Configuration

Command	Comments
INTF:DSnATM:ACCESS [DS1|DS3]	
INTF:DSnATM:ACCESS?	
INTF:DSnATM:FORMAT [UNI|NNI]	
INTF:DSnATM:FORMAT?	
INTF:DSnATM:TX:HEADER:VPVC (chan), (vpi), (vci)	Sets VPI/VCI: chan = Primary, BKGD1, BKGD2 vpi = 0..255 UNI vpi = 0..4095 NNI vci = 0..65535
INTF:DSnATM:TX:HEADER:VPVC? (chan)	Prints VPI/VCI (chan = Primary, BKGD1, BKGD2)
INTF:DSnATM:TX:HEADER:VPVC:NEXT (chan)	Sets the VPI/VCI for the specified channel to be the next VPI/VCI in the scan list
INTF:DSnATM:TX:HEADER:VPVC:NEXT? (Chan)	Prints VPI/VCI (chan = Primary, BKGD1, BKGD2)
INTF:DSnATM:TX:HEADER:PTI (chan), (pti)	Sets the PTI: (chan = Primary, BKGD1, BKGD2 pti = 0..111 binary)
INTF:DSnATM:TX:HEADER:PTI? (chan)	Prints PTI: (chan = Primary, BKGD1, BKGD2)
INTF:DSnATM:TX:HEADER:CLP (chan), (clp)	Sets the CLP: (chan = Primary, BKGD1, BKGD2 clp = 0 or 1)
INTF:DSnATM:TX:HEADER:CLP? (chan)	Prints PTI: (chan = Primary, BKGD1, BKGD2)
INTF:DSnATM:TX:HEADER:GFC (chan), (gfc)	Sets the GFC: (chan = Primary, BKGD1, BKGD2 gfc = 0..1111 binary)
INTF:DSnATM:TX:HEADER:GFC? (chan)	Prints PTI chan = Primary, BKGD1, BKGD2

Table B-3. Remote Control Commands - ATM/AAL Layer Configuration (Continued)

Command	Comments
INTF:DSnATM:RX:HEADER:VPVC (vpi), (vci)	Sets VPI/VCI: vpi = 0..255 UNI vpi = 0..4095 NNI vci = 0..65535
INTF:DSnATM:RX:HEADER:VPVC?	Prints VPI/VCI
INTF:DSnATM:RX:HEADER:VPVC:NEXT	Sets the VPI/VCI for the receive header filter to be the next VPI/VCI in the scan list.
INTF:DSnATM:RX:HEADER:VPVC:FILTER [OFF|VPI|BOTH]	Sets the VPI/VCI filter: OFF = all VPI/VCI combinations VPI = all VCI's in the specific VPI BOTH = specific VCI/VPI
INTF:DSnATM:RX:HEADER:ALL?	Prints the VPI/VCI filter setting.
INTF:DSnATM:RX:HEADER:MASK [CUSTOM|DEFAULT]]	Enables/disables header masking.
INTF:DSnATM:RX:HEADER:MASK?	
INTF:DSnATM:RX:HEADER:MASK:PTI (value), (mask)	Sets the rx header mask for PTI: value = value to filter on, 0..111 mask = bits in PTI to ignore, 0..111
INTF:DSnATM:RX:HEADER: MASK:PTI?	Prints the PTI
INTF:DSnATM:RX:HEADER: MASK:CLP (value), (mask)	Sets the rx header mask for CLP: value = value to filter on, 0/1 mask = bits in PTI to ignore, 0/1)
INTF:DSnATM:RX:HEADER: MASK:CLP?	Prints the CLP
INTF:DSnATM:RX:HEADER: MASK:GFC (value), (mask)	Sets the rx header mask for GFC: value = value to filter on, 0..1111 mask = bits in PTI to ignore, 0..1111
INTF:DSnATM:RX:HEADER: MASK:GFC?	Prints the GFC
INTF:DSnATM:TX [INACTIVE|ACTIVE]	Inactivates/activates all streams.
INTF:DSnATM:TX?	Prints the TX setting.
INTF:DSnATM:TX:RATE:PR_CBR (ddd)	Sets the fixed cell transmit rate for the primary stream: ddd = 0 - maximum cell rate
INTF:DSnATM:TX:RATE:PR_CBR?	Prints the fixed cell transmit rate.
INTF:DSnATM:TX:RATE:PRIMARY[CBR|VBR]	Selects fixed or variable rate for the primary stream.
INTF:DSnATM:TX:RATE:PRIMARY?	Prints the rate type for the primary stream.
INTF:DSnATM:TX:RATE:PR_CBR:UTIL (ddd)	Sets the fixed cell transmit line utilization: ddd = 0 to 100%
INTF:DSnATM:TX:RATE:PR_CBR:UTIL?	Prints the fixed cell transmit line utilization.
INTF:DSnATM:TX:RATE:PR_VBR:SCR:RATE (ddd)	Sets the burst sustained cell transmit rate: ddd = 0 to maximum cell rate

Table B-3. Remote Control Commands - ATM/AAL Layer Configuration (Continued)

Command	Comments
INTF:DSnATM:TX:RATE:PR_VBR:SCR:RATE?	Prints the burst sustained cell transmit rate.
INTF:DSnATM:TX:RATE:PR_VBR:SCR:UTIL (ddd)	Sets the burst sustained cell transmit line utilization: ddd = 0 - 100%
INTF:DSnATM:TX:RATE:PR_VBR:SCR:UTIL?	Prints the burst sustained cell transmit line utilization.
INTF:DSnATM:TX:RATE:PR_VBR:PCR:RATE (ddd)	Sets the burst peak cell transmit rate: ddd = 0 to maximum cell rate
INTF:DSnATM:TX:RATE:PR_VBR:PCR:RATE?	Prints the burst peak cell transmit rate.
INTF:DSnATM:TX:RATE:PR_VBR:PCR:UTIL(ddd)	Sets the burst peak cell transmit line utilization: ddd = 0 - 100%
INTF:DSnATM:TX:RATE:PR_VBR:PCR:UTIL?	Prints the burst peak cell transmit line utilization.
INTF:DSnATM:TX:RATE:PR_VBR:MBS(ddd)	Sets the maximum burst size: ddd = is in cells.
INTF:DSnATM:TX:RATE:PR_VBR:MBS?	Prints the maximum burst size
INTF:DSnATM:TX:OAM:SINGLE	Causes the transmission of 1 OAM cell
INTF:DSnATM:TX:OAM:TYPE [AIS|FERF|CNTCHK|LOOPBK]	Sets the OAM cell type
INTF:DSnATM:TX:OAM:TYPE?	Prints the OAM cell type
INTF:DSnATM:TX:OAM:MGMT [E-TO-E|SEGMENT]	Sets the OAM management type
INTF:DSnATM:TX:OAM:MGMT?	Prints the OAM management type
INTF:DSnATM:TX:OAM:FLOW [F4|F5]	Sets the OAM flow type
INTF:DSnATM:TX:OAM:FLOW?	Prints the OAM flow type
INTF:DSnATM:TX:PAYLD (chan) (xx)	Sets the payload data byte: chan = Primary, BKGD1, BKGD2 xx = 0..FF hexadecimal
INTF:DSnATM:TX:PAYLD (chan)?	Prints the payload data byte
INTF:DSnATM:SCAN [START|STOP]	Start/stops VP/VC scanning
INTF:DSnATM:SCAN?	Prints state of scan mode, (ON/OFF)
INTF:DSnATM:SCAN:COUNT?	Prints the number of VPI/VCI's detected so far during the previous scan
INTF:DSnATM:SCAN:VPI (vpi)	Sets the VPI to scan: vpi = 0..255 UNI vpi = 0..4095 NNI
INTF:DSnATM:SCAN:VPI?	Prints the VPI which will be scanned
INTF:DSnATM:SCAN:VPI_ALL [ON|OFF]	Sets whether to scan all VPI's or just the entered one
INTF:DSnATM:SCAN:VPI_ALL?	Prints VPIs setting
INTF:DSnATM:SCAN:LIST (dd)	Prints the specified VPI/VCI in the scan list: dd = 1..number detected
INTF:DSnATM:SCAN:LIST:CLRALL	Clears the scan list

Table B-3. Remote Control Commands - ATM/AAL Layer Configuration (Continued)

Command	Comments
INTF:DSnATM:TX:RATE:BKGD1:RATE (ddd)	Sets the cell transmit rate for background stream 1: ddd = 0 to maximum cell rate
INTF:DSnATM:TX: RATE:BKGD1:RATE?	Prints the cell transmit rate for background stream 1: ddd = 0 to maximum cell rate
INTF:DSnATM:TX: RATE:BKGD1:UTIL (ddd)	Sets the cell transmit line utilization for background stream 1: ddd = 0 -100%
INTF:DSnATM:TX: RATE:BKGD1:UTIL?	Prints the cell transmit utilization for background stream 1
INTF:DSnATM:TX: RATE:BKGD2:RATE (ddd)	Sets the cell transmit rate for background stream 2: ddd = 0 to maximum cell rate
INTF:DSnATM:TX: RATE:BKGD2:RATE?	Prints the cell transmit rate for background stream 2
INTF:DSnATM:TX: RATE:BKGD2:UTIL (ddd)	Sets the cell transmit line utilization for background stream 2: ddd = 0 - 100%
INTF:DSnATM:TX: RATE:BKGD2:UTIL?	Prints the cell transmit utilization for background stream 2
INTF:DSnATM:RX:MODE:AUTO	Command AUTO detect mode
INTF:DSnATM:RX:MODE [TTC1|TTC4|TEST|CRTD|AAL1|AAL34|AAL5|OAM| GENERIC|UPC_C|UPC_V|CDV]	Set the current test mode TEST mode is equivalent to TTC4
INTF:DSnATM:RX:MODE?	Prints the current test mode
INTF:DSnATM:RX:MODE:UPC_C:PCR (ddd)|	Set the PCR ddd = 0 to maximum cell rate
INTF:DSnATM:RX:MODE:UPC_C:PCR?	Prints the PCR
INTF:DSnATM:RX:MODE:UPC_C:CDVt (ddd)|	Set the CDVt ddd = is in cell times
INTF:DSnATM:RX:MODE:UPC_C:CDVt?	Prints the CDVt
INTF:DSnATM:RX:MODE:UPC_V:PCR (ddd)|	Set the PCR ddd = 0 to maximum cell rate
INTF:DSnATM:RX:MODE:UPC_V:PCR?	Prints the PCR
INTF:DSnATM:RX:MODE:UPC_V:CDVt (ddd)|	Set the CDVt ddd = is in cell times
INTF:DSnATM:RX:MODE:UPC_V:CDVt?	Prints the CDVt
INTF:DSnATM:RX:MODE:UPC_V:SCR (ddd)|	Set the SCR ddd = 0 to maximum cell rate
INTF:DSnATM:RX:MODE:UPC_V:SCR?	Prints the SCR
INTF:DSnATM:RX:MODE:UPC_V:MBS (ddd)|	Set the MBS ddd = 0 to maximum cell rate

Table B-3. Remote Control Commands - ATM/AAL Layer Configuration (Continued)

Command	Comments
INTF:DSnATM:RX:MODE:UPC_V:MBS?	Prints the MBS
INTF:DSnATM:RX:MODE:CDV:PCR (ddd)|	Set the PCR ddd = 0 to maximum cell rate
INTF:DSnATM:RX:MODE:CDV:PCR?	Prints the PCR

Table B-4. Remote Control Commands - ERROR Category Analysis Results

Command	Comments
RESULT? AAL_CRC	Requests the total AAL1 Sequence number protection, AAL3/4 CRC-10 or AAL5 CRC-32 errors.
RESULT? AVG_CPDU	Requests the average valid CS PDU length in octets.
RESULT? CEL_ERR	Requests the total number of cell payload CRC errors (CRC-10 or CRC-16, mode dependent).
RESULT? CEL_ERR%	Requests the ratio of cell payload CRC errors per the number of total cells.
RESULT? CLP_CEL	Requests the total number of received cells with the CLP (cell loss priority) bit set to 1.
RESULT? CLP_PCT	Requests the ratio of received cells with the CLP bit set to 1 per the total number of cells.
RESULT? CPDU_RT	Requests the average CS PDUs per second.
RESULT? F4_AIS	Requests the total number of F4 Alarm Indication Signal OAM cells.
RESULT? F4_ELOOP	Requests the total number of F4 End-to-End Loopback OAM cells.
RESULT? F4_OAM	Requests the total number of F4 OAM cells.
RESULT? F4_RDI	Requests the total number of F4 Remote Defect Indication OAM cells.
RESULT? F4_SLOOP	Requests the total number of F4 Segment Loopback OAM cells.
RESULT? F4_OTHER	Requests the total number of F4 OAM cells, other than AIS, RDI, SLOOP and ELOOP.
RESULT? F5_AIS	Requests the total number of F5 Alarm Indication Signal OAM cells.
RESULT? F5_ELOOP	Requests the total number of F5 End-to-End Loopback OAM cells.
RESULT? F5_OAM	Requests the total number of F5 OAM cells.
RESULT? F5_RDI	Requests the total number of F5 Remote Defect Indication OAM cells.
RESULT? F5_SLOOP	Requests the total number of F5 Segment Loopback OAM cells.
RESULT? F5_OTHER	Requests the total number of F5 OAM cells, other than AIS, RDI, SLOOP or ELOOP.
RESULT? LEN_ERR	Requests the total CS PDU length errors.
RESULT? LI_ERR	Requests the total SAR PDU Length Indication errors.
RESULT? LST_CELL	Requests the total number of lost cells.
RESULT? LST_CEL%	Requests the ratio of lost cells per the number of total cells.
RESULT? PCR_NONC	Requests the number of non-conforming cells exceeding the PCR and CDVt parameters.
RESULT? SEQ_ERR	Requests the total test cell sequence errors.
RESULT? TAG_CELL	Requests the total number of high priority cells (CLP = 0) exceeding the SCR, and sum of CDVt and MBS.
RESULT? TOT_CELL	Requests the total number of non-errored and correctable HEC errored ATM cells received.
RESULT? TOT_CPDU	Requests the total CS PDUs detected.
RESULT? TOT_UNA	Requests the total number of received ATM unassigned cells.

Table B-5. Remote Control Commands - PERFORMANCE Category Analysis Results

Command	Comments
RESULT? AVG_CRTD	Requests the average Cell Round Trip Delay.
RESULT? AVG_GAP	Requests the average inter-cell gap.
RESULT? AVG_TPUT_ATM	Requests the average cell throughput.
RESULT? AVG_%UNA	Requests the average percentage of unassigned cells.
RESULT? AVG%UTIL_ATM	Requests the average percentage of total bandwidth utilization.
RESULT? MAX_CRTD	Requests the maximum Cell Round Trip Delay.
RESULT? MAX_GAP	Requests the maximum inter-cell gap.
RESULT? MAX_TPUT_ATM	Requests the maximum cell throughput.
RESULT? MAX_%UNA	Requests the maximum percentage of unassigned cells per the total number of cells received.
RESULT? MAX%UTIL_ATM	Requests the maximum percentage of total bandwidth utilization.
RESULT? MIN_CRTD	Requests the minimum Cell Round Trip Delay.
RESULT? MIN_GAP	Requests the minimum inter-cell gap.
RESULT? SECB	Requests the total number of Severely Errored Cell Blocks detected.
RESULT? SECB%	Requests the ratio of Severely Errored Cell Blocks per the total number of cell blocks.

Table B-6. Remote Control Commands - T-CARRIER Category Analysis Results

Command	Comments
RESULT? BPVS	Requests the total number of DS1 Bipolar Violations.
RESULT? CPAR_ERR	Requests the total number of DS3 C-bit Parity errors.
RESULT? BIP8	Requests the total number of Physical Layer Convergence Protocol (PLCP) BIP-8 errors detected.
RESULT? CPE_S_A	Requests the total number of DS3 C-bit Parity Error Seconds (Type A).
RESULT? CPE_S_B	Requests the total number of DS3 C-bit Parity Error Seconds (Type B).
RESULT? CPE_S_C	Requests the total number of DS3 C-bit Parity Error Seconds (Type C).
RESULT? CRC_ERR	Requests the total number of DS1 ESF CRC errors.
RESULT? FEBE	Requests the total number of DS3 Far End Block Errors.
RESULT? FEBE_S_A	Requests the total number of DS3 Far End Block Errored Seconds (Type A).
RESULT? FEBE_S_B	Requests the total number of DS3 Far End Block Errored Seconds (Type B).
RESULT? FEBE_S_C	Requests the total number of DS3 Far End Block Errored Seconds (Type C).
RESULT? FRA_ERR	Requests the total number of DS1 or DS3 Framing Errors.
RESULT? FRA_LOSS	This is a common result not specific to the DS1/DS3 ATM Interface. Please consult Analysis Results in the *FIREBERD 6000 Reference Manual.*
RESULT? HEC_COR	Requests the total number of correctable single bit Header Error Check (HEC-C) errors across all VPI/VCIs.
RESULT? HEC_UNC	Requests the total number of Uncorrectable Header Error Check (HEC-U) errors across all VPI/VCIs.
RESULT? LCV	Requests the total number of DS3 Line Code Violations.
RESULT? PAR_ERR	Requests the total number of DS3 P-Bit Parity Errors.

Table B-6. Remote Control Commands - T-CARRIER Category Analysis Results (Continued)

Command	Comments
RESULT? PLC_FEBE	Requests the total number of valid non-zero PLCP FEBE words received.
RESULT? PLCP_FAS	Requests the total number of PLC P Frame Alignment Signal (FAS) errors (result blanked when TC ALIGN is set to TC).
RESULT? PLCP_LOF	Requests the total number of PLCP Loss of Frame events.
RESULT? PLCP_OOF	Requests the total number of PLCP Out of Frame events.
RESULT? RCV_FEAC	Requests the Received Far End Alarm Condition.
RESULT? UNC_ERR%	Requests the ratio of Uncorrectable HEC errors across all VPI/VCIs per total cells.

Table B-7. Remote Control Commands - SIGNAL Category Analysis Results

Command	Comments
RESULT? GEN_FREQ	Requests the transmit clock frequency measurement.
RESULT? RCV_FREQ	Requests the receive clock frequency measurement.

Table B-8. Remote Control Commands - ALARM Category Analysis Results

Command	Comments
RESULT? AIS_SEC	Requests the number of seconds an Alarm Indication Signal was detected.
RESULT? PLCY_SEC	Requests the number of seconds a YELLOW alarm was detected.
RESULT? SIG_LOSS	Requests the total number of DS1 or DS3 signal losses.
RESULT? YEL_SEC	Requests the number of seconds a yellow alarm was detected in DS1 and DS3 framing bits.

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